DOCUMENT RESUME

ED 128 429 TM 005 614

AUTHOR Pedrini, Bonnie C.; Pedrini, D. T.
TITLE The Usefulness of ACT Scores in Predicting Achievement and Attrition Among Disadvantaged and Regular Freshmen: A Survey and Study.
NOTE 194p.

EDRS PRICE MF-$0.83 HC-$10.03 Plus Postage.
DESCRIPTORS Academic Achievement; *College Entrance Examinations; College Freshmen; *College Students; *Disadvantaged Youth; *Dropout Identification; Dropout Rate; *Grade Prediction; Higher Education; Low Income Groups; *Predictive Ability (Testing); Racial Differences; Scores; Standardized Tests; Test Bias
IDENTIFIERS *American College Test

ABSTRACT

The purposes of this study were to determine (1) the usefulness of ACT composite scores in assessing and predicting achievement and attrition of disadvantaged and regular freshmen at the University of Nebraska at Omaha during the 1972-73 academic year, and (2) the effectiveness of a special program in keeping low income students in school during their freshman year. Factors considered were: ACT scores, college grades, race, sex, socioeconomic status, financial aid, and employment. It was found that ACT scores were effective predictors of college grades among white students, but not among black students, regardless of income level. ACT scores were also effective predictors of attrition/persistence only among regular students in large samples, college grades being more potent for this purpose. The special program appeared more successful than the regular program in preventing attrition, especially among men and blacks; and receiving financial aid was better than not receiving financial aid. (Author/BW)

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ED128429

THE USEFULNESS OF ACT SCORES IN PREDICTING ACHIEVEMENT AND ATTRITION AMONG DISADVANTAGED AND REGULAR COLLEGE FRESHMEN:

A SURVEY AND STUDY

U.S. DEPARTMENT OF HEALTH,
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TM005 614

THE USEFULNESS OF ACT SCORES IN PREDICTING ACHIEVEMENT AND ATTRITION AMONG DISADVANTAGED AND REGULAR COLLEGE FRESHMEN:

A SURVEY AND STUDY

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Generally, standardized achievement/aptitude tests have been shown to be valid predictors of college academic achievement. Specifically, the use of these tests with disadvantaged and minority students has been discredited because of purported biases; some studies have indicated that standardized tests are valid predictors despite purported biases. Also problematic was the prediction of achievement, from standardized tests, for special program participants. The prediction of attrition/persistence has been shown to be directly related to college grades and indirectly related to test scores. Other factors shown to be important for the prediction of college success and considered in this study were: race, sex, socioeconomic status, financial aid, and employment.

The Goodrich program at UNO, named after Nebraska state Senator Glenn Goodrich, is a special program for low income (disadvantaged) students. The effectiveness of special college programs has often been evaluated in terms of attrition and occasionally in terms of participants' grades.

The purposes of this study were to determine 1) the usefulness of ACT Composite scores in assessing and predicting achievement and attrition of disadvantaged (Goodrich) and regular freshmen at UNO during the 1972-73 academic year and 2) the effectiveness of the Goodrich program in keeping low income students in school during their freshman year. There were 1,214 first semester, 1972, full-time students comprising the UNO ACT freshman population. There were 150 in the experimental and control sample--75 disadvantaged (Goodrich) students in the experimental group, 75 regular students in the control group.

Analyses of variance were computed to determine mean differences among several factors for 1) ACT scores, 2) grades, and 3)attrition/persistence. Chi squares were computed using large samples to determine if significant differences existed between ACT scores, or grades, or attrition/persistence, and other variables. Product moment correlations were computed to determine the degree of association between several independent variables and ACT scores, grades, or attrition/persistence, as dependent variables. Multiple correlations, standard errors, and regression equations were computed for the prediction of grades and attrition/persistence.

Major findings of this study follow. ACT scores were: effective predictors of college grades among White students--disadvantaged (Goodrich) and regular; not viable predictors of college grades among Black students--disadvantaged (Goodrich) and regular; effective predictors of college attrition/persistence among regular students in large samples; not viable predictors of college attrition/peristence among disadvantaged (Goodrich) and control students in small samples. College grades were potent predictors of attrition/persistence among disadvantaged (Goodrich) and regular students. In terms of overall GPA's: disadvantaged (Goodrich) students did better than control students (However, this appeared to be an artifact produced by Goodrich courses which elevated experimental GPA's.). In terms of persistence: the Goodrich program was better than the regular program, especially for men and for Blacks (However, this may be an artifact related to Goodrich courses which elevated experimental GPA's. Higher grades were conducive to persistence.); receiving financial aid was better than not receiving financial aid.

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CHAPTER I

INTRODUCTION TO THE PROBLEM

College admission procedures vary from institution to institution. Recent trends have indicated a number of programs waiving traditional admission criteria and re-evaluating their admission practices.[1] The emphasis on change has been philosophical, namely, that colleges must adjust to the needs and characteristics of students rather than impose their own requirements.[2] It has been reported that many institutions are committed to restructuring their student bodies in order to make them representative of the total population in terms of race, culture, and social status.[3]

This emphasis on greater accessibility to American colleges and universities has given impetus to the development of an open admission policy.[4] A working definition of open admission suggested by current literature is a system in which high school graduates are not hindered in the attainment of desired education by past academic performance, financial situation or other socioeconomic factors.[5] Consequently, open admission has been viewed by some as a means to providing equal educational opportunity.[6]

However, minority access to college has not meant minority success in college. To fulfill the social responsibility that accompanies open admission, schools adopting such a policy will have to offer supportive services to students.[7] These services may include special compensatory/remedial programs and increased financial aid.

The University of Nebraska at Omaha (UNO) is a university in an urban setting with an open admission policy. In 1970 a Regents Commission was established to examine the appropriate role of UNO as an urban university in the 1970's and to "recommend educational philosophies and programs which it believed should be incorporated into the mission of UNO."[8] The Regents Commission Report made reference to the "human and social deficiencies in the environment" to which the university should "make a major response by dramatically expanding educational opportunities for Blacks and generally for poverty students,"[9] and by seeking out "disadvantaged and minority group students in order to expand educational opportunities."[10]

In close temporal proximity to the Regents Commission study, the Nebraska State Legislature reviewed student tuition remissions (discounts) at the various state colleges and state university campuses. It was determined that: 1) the rate of student tuition remissions was approximately 13 percent at the University of Nebraska at Lincoln (UNL), 11 percent at the state colleges, and 6 percent at the University of Nebraska at Omaha (UNO);[11] 2) the tuition at UNO was one third higher than at state colleges, for which students received only one half the percentage of tuition remissions (discounts);[12] and 3) students at UNL paid no more tuition for costly advanced degree courses than students at UNO, but received twice the level of tuition remissions.[13] These findings suggested that UNO had the greatest need for legislative funds in order to raise its tuition remission to the approved 10 percent level. Consequently, Amendment 1476, which provided UNO with $266,832 for a program to increase the enrollment and continued education of economically deprived young persons, was passed during the 1972 session of the Nebraska Legislature.[14]

The resultant program developed at UNO, in keeping with the Regents Commission recommendations and initiated by the state appropriation, is called the Goodrich Plan (after Senator Glenn Goodrich). The aim of the program is to provide a quality education to low income students who would otherwise probably not be in school. The philosophy of the program is that the intellectual capacity of economically disadvantaged students is the same as that of students admitted to the university through the regular process. Thus, Goodrich students are presented with rigorous, challenging, stimulating offerings from the outset, augmented by supportive services when necessary to aid their achievement.

The Goodrich Plan attempts to program disadvantaged students for success by providing: 1) financial assistance, 2) a special educational curriculum, and 3) extensive counseling services. Goodrich students receive financial aid in the form of free tuition. They are full-time students, that is, they are enrolled for a minimum of twelve hours. The curriculum for the program centers around core courses, taught by scholars in residence, that is, leaders in a particular field who are brought to UNO for a semester or a year. The core, twelve semester hours per year (six each semester), focuses on humanities and social sciences the freshman and sophomore years. The format of the core varies. Small group and one-to-one tutorial seminars may take one to two hours per week. The tutors are faculty members and are assigned to students for four years; they take on the role of counselor, as well as instructor. Graduate student assistants are also assigned to work directly with Goodrich students in areas of academic and personal preparation. The remaining core time is spent in large and intermediate group activities--lectures, discussion groups, study groups which concentrate on different contemporary problems of urban society. At present, there are no Goodrich courses, per se, during the junior and senior years. However, there are planned social contacts and activities.

Students were recruited and selected for the Goodrich program in the spring and summer of 1972 and the program became operational in the fall of 1972. Although UNO attempted to provide equal educational opportunity, financial aid was not available for all who requested it.[15] Consequently, admission standards were necessary for restricted programs such as the Goodrich Plan. The Goodrich selection procedure included reviewing general achievement/aptitude tests scores. This traditional approach seemed necessary and justified if the program was to progress with the philosophy stated earlier. However, there has been considerable literature discrediting the use of standardized test scores with disadvantaged and minority students because of purported biases: cultural,[16] socioeconomic,[17] racial,[18] ethnic,[19] and sex;[20] excessive reliance on verbal abilities;[21] a tendency for test results to act as self-fulfilling prophecies;[22] and extreme negative feelings associated with the test-taking experience on the part of these students.[23] On the other hand, there has been research suggesting that whether or not general achievement/aptitude tests are biased toward disadvantaged and minority students[24] they are still valid predictors of these students' grades.[25] Several studies have demonstrated that colleges could reduce their admission criteria for disadvantaged students without decreasing their standards[26] or increasing their attrition rates.[27]

Typically, general achievement/aptitude tests have not provided separate norms for disadvantaged/minority persons. Thus, while the test scores may have been accurate, the lack of appropriate norms made the predictive validity for that group questionable.[28] The appropriateness of general achievement/aptitude test scores for disadvantaged/minority students may be more relevant when considered with other variables, for example, sex.

There are a number of specialized programs for disadvantaged/minority students in existence today. The effectiveness of these programs is questionable with regard to academic achievement.[29] The Goodrich Plan differs significantly from most other programs[30] because it assumes the competence of the students admitted and only secondarily considers remediation. Also, Goodrich student backgrounds are considered differences, not hinderances.

In view of the research findings (briefly considered above, but detailed in the history chapter), the situation with regard to college entrance tests for disadvantaged/minority students is problematic and complex. However, rather than abandon entrance tests, it would seem that additional research is warranted to help clarify the relationships between tests scores of regular and disadvantaged students and their success or failure in programs designed for them. This study investigated these relationships at UNO.

STATEMENT OF THE PROBLEM

The purposes of this study were to determine 1) the usefulness of ACT Composite scores in assessing and predicting achievement and attrition of disadvantaged (Goodrich) and regular freshmen at UNO during the 1972-73 academic year and 2) the effectiveness of the Goodrich program in keeping low income students in school during their freshman year.

SIGNIFICANCE OF THE STUDY

Although open admission procedures have gained popularity[31] and many institutions have expressed a desire to enroll more disadvantaged and minority students,[32] the changes in higher education with regard to admission criteria and special programs for minority groups have been minimal.[33] Admission criteria may not have been altered in many institutions because there has been research suggesting that despite test biases, persons predicted to earn low grades will have difficulty if no special treatment is involved.[34] However, the prediction of achievement for special program participants from standardized test scores is problematic. This is especially true for the Goodrich program which does not emulate the usual format followed by specialized programs for disadvantaged/minority students.[35]

The open admission policy at UNO assures any high school graduate entrance to the university, regardless of his standardized test scores, that is, test scores are not used for screening purposes for general admission. However, ACT scores, grade point averages, and other considerations can be used to develop regression equations, valuable for predictive purposes. The data from this study could be used to develop these predictive tools for disadvantaged and regular students categorized, for example, by sex and race. Such information could be useful in identifying potentially successful or unsuccessful students, dropouts or persisters. These strategies could: 1) be used to minimize attrition and maximize success via changes in remediation and/or other procedures, for example, financial aid distribution, and 2) provide a means for assessing the need to continue or initiate special programs, such as the Goodrich Plan.

Unlike general admission, Goodrich admission is limited and, therefore, selective. Recent cutbacks in federal programs designed to provide funds to financially needy students[36] may greatly increase the number of Goodrich applicants, thereby, augmenting the need for an efficient selection procedure. The data from this study could yield appropriate regression equations (based on ACT scores and other variables) for the prediction of grades or attrition for Goodrich students categorized by several factors. Such developments could be valuable in establishing a sensitive, realistic Goodrich screening procedure, employing a minimum-loss decision strategy.[37]

Studying the effectiveness of the Goodrich plan in keeping low income students in school could provide insight for possible alterations which would strengthen this program and others. Information generated from this study could yield a way of evaluating the program and could support expansion. If the program were successful it could provide: 1) a means of equalizing the balance between disadvantaged/minority and regular students on campus so that minority representation on campus would mirror minority representation within the community, and 2) a valuable model for other institutions planning special programs for low income persons.

ASSUMPTIONS

1. The stratified (for race and sex) random sample of freshmen was representative of the stratified parent population.

2. The experimental and control students who received financial aid, based on need, were representative of economically disadvantaged students.

3. The experimental and control students who achieved ACT Composite scores one standard deviation below the mean (based on college bound seniors[38]) were representative of academically deficient students.

4. The experimental and control students who received financial aid, based on need, and achieved ACT Composite scores one standard deviation below the mean (based on college bound seniors[39]) were representative of academically deficient/economically disadvantaged students.

5. The ACT Composite standard score was a good general measure of academic achievement/aptitude.

6. The cumulative grade point average was a good indicator of academic college success.

DELIMITATIONS

This study pertained to the 1972-73 academic year. It was confined to the University of Nebraska at Omaha (UNO) and considered only full-time freshmen who had enrolled for the first time during the fall semester. Although UNO has an open admission policy, all students are required to send in their scores on the American College Test (ACT) and/or the Scholastic Aptitude Test (SAT) as part of the admission procedure. A large majortiy of the students take the ACT, a small minority take the SAT, and the few remaining take both the ACT and SAT. Only students who had taken the ACT were considered for the various analyses. The individual ACT subtest scores of English, mathematics, social studies, and natural sciences were averaged to yield the Composite score; only the ACT Composite score was used for the various analyses. The subgroup of race was limited to Afro-Americans/Blacks and Caucasians/Whites. Transfer students were not identified separately and were considered as part of the attrition rate. The major findings of this study are limited to the University of Nebraska at Omaha.

DEFINITION OF TERMS

Academically Deficient Student

An academically deficient student was one whose academic history was poor; typically, these students had very low scores on standardized achievement/aptitude tests. For this study, students with ACT Composite scores one standard deviation below the mean (based on the ACT population of college bound high school seniors) were considered academically deficient.

Academically Deficient/Economically Disadvantaged Student

An academically deficient/economically disadvantaged student was one with a poor academic history and low socioeconomic status. In this study, students who achieved ACT Composite scores one standard deviation below the mean (based on the ACT population of college bound high school seniors) and received financial aid, based on need, were considered academically deficient/economically disadvantaged.

Achievement/Aptitude Test

Achievement/aptitude tests are designed to appraise many different attributes of individuals. In this study, a general achievement/aptitude test referred to a test used to predict future academic performance; the ACT was considered this kind of test.

ACT Composite Score

The ACT Composite score is the average of the standard scores obtained on the American College Test subtests of English, mathematics, social studies, and natural sciences. The ACT Composite score is a standard score; the term was used interchangeably with ACT Composite standard score and ACT score.

ACT Freshmen Population

The ACT freshmen population referred to in this study was all, UNO, first semester, full-time freshmen in the fall of 1972 who had taken the ACT.

Attrition/Persistence

In this study attrition/persistence referred to UNO college student enrollment. Attrition indicated that a student was not continuously enrolled for the fall and spring semesters of the 1972-73 academic year or did not re-enroll in the fall of 1973. Persistence indicated that a student was continuously enrolled for the fall and spring semesters of

1972-73 and re-enrolled for the fall of 1973.

Attrition/Persistence Score

Attrition/persistence score referred to a score of one or two indicating that a student was a dropout or persister, respectively. The term was used interchangeably with attrition score. See the definitions of dropout and persister for further clarification.

College Success

Academic college success for this study was defined as the cumulative grade point average (GPA); the higher the cumulative GPA, the greater the success.

Control Group

The control group in this study was a stratified (for race and sex) random sample of UNO, full-time freshmen who had taken the ACT and who had registered for the first time in the fall of 1972. The control group was equated in number with the Goodrich sample (that is, the experimental group). Between the groups (experimental and control), there were equal numbers of Black men, Black women, White men, and White women. However, within the groups (experimental or control), there were unequal numbers of Black men, Black women, White men, and White women.

Cumulative Grade Point Average (GPA)

For this study cumulative GPA referred to a student's mean grade for all the subjects taken during the fall and spring semesters at UNO during the 1972-73 school year.

Disadvantaged Student

A disadvantaged student was one whose financial resources were extremely limited; typically, these persons were of low socioeconomic status. For this study those who received financial aid based on need were considered disadvantaged students. The terms "financially needy," "economically disadvantaged," and "low income" student were used interchangeably with the term "disadvantaged" student.

Dropout

A dropout in this study referred to a student who did not complete the 1972-73 school year and/or did not register for the 1973 fall semester at UNO.

Economically Disadvantaged Student

See disadvantaged student.

Educational Support Program (ESP)

The educational support program is a special program at UNO for students who have limited skills in the areas of reading and writing. There are many kinds of courses offered by ESP in various departments, for example, some Psychology 101 (Introduction to Psychology) sections.

Experimental Group

The experimental group in this study consisted of Goodrich freshmen (enrolled for the first time in the fall of 1972) who had taken the ACT. Generally, the experimental subjects came from families with annual incomes below $9,000. The experimental group included men and women, Blacks and Whites.

Financial Aid

Financial aid referred to any type of monetary aid given to a student to pay for educational expenses. There were various programs from which this aid could be obtained. For this study, financial aid referred to any monetary award, based on need, presented to a student through the UNO financial aid office.

Financially Needy Student

See disadvantaged student.

Goodrich Program

The Goodrich program is a special program at UNO designed for low income students, that is, students whose annual family income was below $9,000. The term was used interchangeably with Goodrich Plan.

Grades

In this study grades referred to student cumulative GPA's dichotomized as below average (below 2.0 on a 4.0 scale) and average or above average (equal to or above 2.0 on a 4.0 scale).

Low Income Student

See disadvantaged student.

Persister

A persister in this study referred to a student who 1) enrolled as a full-time freshmen for the first time in the fall of 1972 at UNO, 2) completed the fall, 1972 semester at UNO, 3) enrolled and completed the spring, 1973 semester at UNO, and 4) re-enrolled for the fall, 1973 semester at UNO.

Set

A set referred to the population, the largest sample, or the largest group, depending upon the analysis used, for example, chi square, variance, or correlational.

Subset

A subset referred to a set within a set. All the members of a subset were also members of the overall set. A subset contained some but not all the members of a set. Subsets categorized students according to variables or factors.

HYPOTHESES

The hypotheses of this research study were stated in the null form[40] as follows:

ACT Scores

There were no significant differences between the ACT Composite scores of the experimental group and the control group or the subsets within and between these groups. (Resolved by analyses of variance.)

With regard to ACT scores, there were no significant group, instruction, financial aid, race, sex, grade, or attrition differences for subjects in the ACT freshmen population, or subsets within this population. (Resolved by chi square analyses.)

There were no correlational relationships which were significantly different from zero between ACT scores and financial aid, race, sex, grades, or attrition/persistence for the experimental group, control group or subsets within and between these groups. (Resolved by product moment correlations.)

College Grades

There were no significant differences between the grades of the experimental group and the control group or the subsets within and between these groups. (Resolved by analyses of variance.)

With regard to grades, there were no significant group, instruction, financial aid, race, sex, or general achievement/aptitude differences for subjects in the ACT freshmen population, or subsets within this population. (Resolved by chi square analyses.)

There were no correlational relationships which were significantly different from zero between grades and financial aid, general achievement/aptitude, race, or sex for the experimental group, control group, or subsets within and between these groups. (Resolved by product moment correlations.)

There were no significant multiple predictors of grades for subjects in the experimental and control sample, or subsets within this sample. (Resolved by multiple correlation and regression techniques.)

College Attrition/Persistence

There were no significant differences between the attrition/persistence scores of the experimental group and the control group or the subsets within and between these groups. (Resolved by analyses of variance.)

With regard to attrition/persistence, there were no significant group, instruction, financial aid, race, sex, grade , or general achievement/aptitude differences for subjects in the ACT freshmen population, or subsets within this population. (Resolved by chi square analyses.)

There were no correlational relationships which were significantly different from zero between attrition/persistence and financial aid, general achievement/aptitude, race, sex, or grades for the experimental group, control group, or subsets within and between these groups. (Resolved by product moment correlations.)

There were no significant multiple predictors of attrition/persistence for subjects in the experimental and control sample or subsets within this sample. (Resolved by multiple correlation and regression techniques.)

NOTES AND REFERENCES

[1] W. W. Willingham, Free-Access Higher Education (New York: College Entrance Examination Board, 1970).

[2] Ibid.

[3] T. A. Butts, "College Admissions for the Culturally Distinct," Caps Capsule, 4:7-9, Winter, 1971 (Washington, D. C.: ERIC Counseling and Personnel Services Information Center).

[4] C. H. Shulman, "Open Admissions in Higher Education" (Washington, D. C.: ERIC Clearinghouse on Higher Education, June, 1971).

[5] Ibid.

[6] W. W. Willingham, "Educational Opportunity and the Organization of Higher Education" (paper presented at the College Entrance Examination Board colloquium on "Barriers to Higher Education," June, 1971, Racine); see also S. Resnick and B. Kaplan, "Report Card on Open Admissions: Remedial Work Recommended," The New York Times Magazine, May 9, 1971.

[7] Statement of the Board of Trustees, National Urban League on Open Admissions in American Colleges and Universities, cited by C. H. Shulman, loc. cit.

[8] Regents' Commission on the Urban University in the 70's. Report of the Regents' Commission on the Urban University in the 70's (Omaha: University of Nebraska Board of Regents, Sept. 30, 1970), p. iii.

[9] Ibid., p. 13.

[10] Ibid., p. 19.

[11] Statement by Glenn Goodrich, personal interview, March 6, 1973.

[12] Ibid.

[13] Ibid.

[14] Ibid.

[15] D. Roddy, cited by M. Fisher, "Need Money Fast?" The Gateway [University of Nebraska at Omaha] Nov. 8, 1972, p. 8.

[16] Butts, loc. cit.; see also J. H. Borup, "The Validity of the American College Test for Discerning Potential Academic Achievement Levels: Ethnic and Sex Groups," Journal of Educational Research, 65:3-6, Sept., 1971; see also R. Nunez, "Recruitment and Admission of Minority Students: The Glaring Reality," The Minority Student on Campus: Expectations and Possibilities, eds. R. A. Altman and P. O. Snyder (Boulder: Western Interstate Commission for Higher Education, 1971), pp. 127-140.

[17] Commission on Tests, Report of the Commission on Tests: I. Righting the Balance (New York: College Entrance Examination Board, 1970); see also F. Bowles and F. A. DeCosta, Between Two Worlds (New York: McGraw Hill, 1971).

[18] F. J. Barros, "Equal Opportunity in Higher Education," Journal of Negro Education, 37:310-315, Summer, 1968; see also J. C. Stanley, A. B. Biaggio, and A. C. Porter, "Relative Predictability of Freshmen Grade Point Averages from SAT Scores in Negro and White Southern Colleges" (paper read at American Research Association and the National Council on Measurement in Education, Chicago, Feb., 1966); see also G. Temp, "Validity of the SAT for Blacks and Whites in Thirteen Integrated Institutions," Journal of Educational Measurement, 8:245-251, Winter, 1971; see also J. Harris and J. Reitzel, "Negro Freshmen Performance in a Predominantly Non-Negro University," Journal of College Student Personnel, 8:366-368, Nov., 1967; see also S. C. Davis, J. W. Loeb, and L. F. Robinson, "A Comparison of Characteristics of Negro and White College Freshmen Classmates," Journal of Negro Education, 39:359-366, Fall, 1970.

[19] Borup, loc. cit.

[20] Borup, loc. cit.; see also F. L. Denmark, R. T. Riley, and E. J. Shirk, "Cognitive Correlates of Academic Performance" (paper read at Eastern Psychological Association, Atlantic City, April, 1970).

[21] S. A. Kendrick, "The Coming Segregation of Our Selective Colleges," College Board Review, 66:6-13, Winter, 1967-68.

[22] D. A. Goslin, "What's Wrong with Tests and Testing--Part 1," College Board Review, 65:12-18, Fall, 1967.

[23] R. R. DeBlassie and K. Boswell, "The Culturally Disadvantaged College Student," Journal of the National Association of Women Deans and Counselors, 35:126-132, Spring, 1972.

[24] R. E. Pandey, "The SCAT and Race," Psychological Reports, 28:459-462, April, 1971; see also R. L. Flaugher and D. A. Rock, "Patterns of Ability Factors Among Four Ethnic Groups," Proceedings of the Annual Convention of the American Psychological Association, Vol. 7, (pt. 1) (Princeton: Educational Testing Service, 1972), pp. 27-28; see also J. A. Davis and G. Temp, "Is the SAT Biased Against Black Students?" College Board Review, 81: 4-9, Fall, 1971.

[25] DeBlassie and Boswell, loc. cit.; see also J. Bowers, "Factor Structures and Predictive Validities of College Ability Tests for Regularly Admitted and Disadvantaged Beginning Freshmen at the University of Illinois" (paper read at American Educational Research Association, Minneapolis, March, 1970); see also S. A. Kendrick and C. L. Thomas, "Transition from School to College," Review of Educational Research, 40:151-179, Feb., 1970; see also J. C. Stanley, "Predicting College Success of the Educationally Disadvantaged," Science, 171:640-647, Feb., 1971; see also R. L. Flaugher, "Testing Practices, Minority Groups, and Higher Education: A Review and Discussion of the Research" (Princeton: Educational Testing Service), (Washington, D. C.: ERIC Clearinghouse on Tests, Measurement, and Evaluation, June, 1970).

[26] E. Nicholson, "Success and Admission Criteria for Potentially Successful Risks" (Brown University, March, 1970), (*College Student Personnel Abstracts*, 6:144-145, Winter, 1970-71); see also J. Egerton, "High Risk: Five Looks," *Southern Education Report*, 3:25-36, April, 1968.

[27] A. W. Astin, "Racial Considerations in Admissions," *The Campus and the Racial Crisis: Background Papers for Participants in the 1969 Annual Meeting of the American Council on Education* (Washington: The Council, 1969), pp. 65-93.

[28] B. Blai, Jr., "Pressures and Practices in College Admissions," *College and University*, 43:167-177, Winter, 1968; see also Egerton, loc. cit.; see also Nicholson, loc. cit.; see also Harris and Reitzel, loc. cit.

[29] F. F. Harcleroad, "Disadvantaged Students: What Makes for College Survival" (paper read at American Association for Higher Education, Chicago, March, 1971); see also Kendrick and Thomas, loc. cit.

[30] Harcleroad, ibid.

[31] Shulman, loc. cit.

[32] W. E. Sedlacek, G. C. Brooks, Jr., and L. A. Mindus, *Black and Other Minority Admissions to Large Universities: Three Year National Trends*, Research Report No. 3-72 (Cultural Study Center, University of Maryland, 1972); see also H. S. Dyer, "Recruiting the Disadvantaged: An Urgent Need," *College Admissions Policies for the 1970's* (New York: College Entrance Examination Board, 1968), pp. 96-113; see also W. W. Willingham, *Admission of Minority Students in Midwestern Colleges* (New York: Midwest Committee for Higher Education Survey, College Entrance Examination Board, May, 1970).

[33] Sedlacek, Brooks, and Mindus, ibid.; see also Kendrick, loc. cit.; see also J. Egerton, "The White Sea of Higher Education," *The Minority Student on the Campus: Expectations and Possibilities*, eds. R. A. Altman and P. O. Snyder (Boulder: Western Interstate Commission for Higher Education, 1971), pp. 35-41; see also W. E. Sedlacek and G. C. Brooks, Jr., "Black Freshmen at Large Colleges: A Survey," *Personnel and Guidance*, 49:307-312, Dec., 1970; see also W. E. Sedlacek, G. C. Brooks, Jr., and J. L. Horowitz, *Black Admissions to Large Universities: Are Things Changing?* Research Report No. 3-71 (Cultural Study Center, University of Maryland).

[34] Flaugher, loc. cit.; see also Pandey, loc. cit.; see also Davis, Loeb, and Robinson, loc. cit.; see also J. C. Stanley and A. C. Porter, "Correlation of Scholastic Aptitude Test Scores with College Grades for Negroes Versus Whites," *Journal of Educational Measurement*, 4:199-217, Winter, 1976; see also D. D. Sampel and W. R. Seymour, "The Academic Success of Black Students: A Dilemma," *Journal of College Student Personnel*, 12:243-247, July, 1971.

[35] Harcleroad, loc. cit.

[36] "Financial Troubles May Cut College Rolls," *Sunday World Herald* [Omaha], Aug. 5, 1973, p. 22-B, cols. 1-2.

[37] E. G. Bogue, "Application of a Minimum-Loss Decision Strategy in the Selection of Cutoff Points in College and University Admissions," College and University, 43:131-142, Winter, 1968.

[38] American College Testing Program, Using the ACT on Campus (Iowa City: American College Testing Program, 1972), p. 3.

[39] Ibid.

[40] E. L. Hays and R. L. Winkler, Statistics: Probability, Inferences, and Decision (New York: Holt, Rinehart, and Winston, 1971), pp. 394-396.

CHAPTER II

REVIEW OF RELATED RESEARCH

Educational administrators have always found it beneficial in the decision making process to be able to predict behavior. The prediction of academic success and attrition has been especially important to selective institutions of higher education in their attempt to screen applicants applying for admission. As a consequence, there has been considerable research reported concerning these topics. The research literature presented in this chapter has been divided into the following sections: Prediction of Academic Achievement; Prediction of Attrition; and Factors Related to Academic Achievement and Attrition.

PREDICTION OF ACADEMIC ACHIEVEMENT

As early as the 1920's it was recognized that there were many variables which could be used to predict a student's achievement in college--high school grades,[1] achievement/aptitude test scores,[2] reading ability,[3] intelligence,[4] ability to study,[5] mental health,[6] and motivation.[7] However, possibly because of their availability, researchers have tended to emphasize two measures as academic predictors--high school grades and achievement/aptitude test scores.

Using these measures, high school performance and test scores, independently or in combination, it soon became apparent that they provided variable success in predicting overall scholarship and achievement in a particular field. Using Cooperative Test Service Scores, College Entrance Examination Board (CEEB) Verbal scores, CEEB mean scores, and the mean of secondary school (senior) final grades, Landry found considerable variation existed in the predictive ability of the various measures for the different subject matter fields and for the different colleges studied.[8] Nelson concluded that when all students were considered, the Denny Reading Test seemed superior to English tests and to high school content exams for the prediction of scholarship;[9] while Schmitz found that individual tests, in a battery, were approximately of equal value in predicting college success.[10] Preas reported that high school records were generally the best predictors of college grade point average (GPA), English GPA, and mathematics GPA; but that Scholastic Achievement Test (SAT) scores were specifically the best predictors of college GPA.[11] Cole presented information gathered from 100 colleges and universities which indicated that high school subject-area grades were more related to college subject-area grades than were American College Test (ACT) scores, although the ACT scores remained closely related to overall academic success.[12] Loeb and Mueller compared the first-term GPA's of 5,300 freshmen at the University of Illinois with their predicted GPA based on ACT Composite (ACT:C) scores, high school percentile rank (HSPR), and a computed high school discrepancy score. They found that the ACT:C and HSPR were equal in correlating with GPA and the best two-predictor combination for GPA was HSPR plus ACT:C.[13] In 1970, the Commission on Tests,[14] stated that "for a large and heterogeneous group of freshmen, the combination of high school grades and aptitude test scores will usually predict about two-thirds of their freshmen grade-point averages within half a letter grade or so."[15] Thus, conflicting reports were and continue to be published concerning the predictive value of specific and general area achievement/aptitude tests and high school grades for college success.[16]

Many studies which reported using achievement and/or aptitude tests to predict academic success found verbal factors to be extremely important.[17] These verbal factors involved some type of reading skill. Consequently, a large number of studies concentrated on the predictive value of reading, per se.[18]

The relationships between and among general and specific reading skills and academic achievement in college have not been clear. At a midwestern liberal arts college, Wellington reported that the most academically successful men were more likely to make higher scores on the Ohio State Psychological Examination and on the vocabulary and reading comprehension sections of the Nelson Denny Reading Tests than were the most academically unsuccessful men.[19] In a study using a group of dean's list students and a group of students on academic probation, no significant differences were found between the groups for reading rate or vocabualry. However, the former group was found to be significantly superior in verbal comprehension.[20] Neville compared good and poor readers and noted that "predictions of success or failure among poor readers could be made with limited accuracy."[21] In her study of 163 Boston University freshmen, Lanigan's data revealed that the Minnesota Speed of Reading Test did not differentiate well between high and low achieving students.[22] Thus, while reading has been an important variable in college success, its predictive validity has been questionable.

Recent research has tended to emphasize using nonacademic achievements or nonintellectual correlates with high school academic achievements and/or standardized test scores in the prediction of college success.[23] Conflicting results have been reported in the literature. Fudge,[24] and Lunneborg and Lunneborg[25] determined that biographical information greatly enhanced the accuracy of prediction of academic college performance. It was shown, in a study of 760 freshmen at the University of Washington, that achievement/aptitude records tended to be more predictive of success in the areas of engineering and natural science than were the biographical predictors. The opposite was true in the areas of education and humanities.[26] Using an interest scale and a motivation questionnaire, it was reported that neither contributed significantly to the accuracy of prediction of freshmen GPA based on high school grades and scholastic aptitude scores.[27] Spencer and Stallings determined that nonintellective data obtained from the Student Profile Section of the ACT added virtually nothing to ACT aptitude scores in predicting first semester GPA.[28] Thus, there has been little agreement as to which nonacademic achievements or biographical data should be considered, and the degree to which prediction is improved, if any, by the inclusion of such information.

In summary, the research concerned with the prediction of college success has considered many single and multiple predictor variables. The literature was replete with reports studying the predictive validity of high school grades and achievement/aptitude test scores. Measures of reading ability, and more recently, biographical data, were also factors commonly studied for predictive purposes. While many factors have been important, it appears that for the majority of students applying for college entrance, "the high school average (or class rank) is...the best single predictor of college grades; aptitude test scores...add appreciably to the accuracy of that prediction, and scores on tests in specific subject-matter areas add only a modest amount of predictive power to the combination of high school grades and aptitude test scores."[29]

PREDICTION OF ATTRITION

High attrition rates have been costly to students and to institutions themselves, in terms of money and time and effort.[30] Attrition rates also have indicated, in part, the extent to which universities are not meeting student needs. Consequently, the study of attrition has been an important aspect of administration at institutions of higher education.

The research literature concerned with college attrition has typically described characteristics of dropouts and persisters, rather than predicted attrition, per se. Recently, researchers have tended to subcategorize dropouts to account for transfers and students who withdrew in good or poor academic standing. Several variables have been identified as being related to attrition--nonintellective factors;[31] dissatisfaction with the institution,[32] its programs;[33] student personality;[34] biographical data;[35] high school performance;[36] college performance;[37] and achievement/aptitude test scores.[38] As with the prediction of academic achievement, the literature on attrition was replete with studies investigating past academic performance and test scores.

A number of reports considered the prediction of attrition using high school grades and/or achievement/aptitude test scores. Often, they contrasted dropouts and persisters. In a study of Clemson University students, Hardie and Anderson considered SAT scores and their relationship to attrition. They found that the first year dropouts tended to score low in mathematics; second year dropouts scored equally well in mathematics and verbal ability; and third year dropouts scored low in verbal ability.[39] Blanchfield's study of college dropouts at Utica College indicated that dropouts had lower high school ranks and lower GPA's than the successful students. He also noted that high school average and SAT scores did not differentiate between the two groups of students.[40] Chase reported no significant differences between students who dropped out or persisted through their junior year in terms of SAT scores, but high school rank was positively related to persistence.[41] Trapp, Pailthorp, and Cope indicated that dropping out seemed to be related to lower test scores.[42] A comprehensive national profile developed from data collected at 251 representative colleges and universities revealed that high school grades and scores on standardized tests of academic ability, singly or in combination were the best predictors of college persistence.[43]

College performance or grade point average (GPA) has been shown to be a major determinant of student attrition.[44] Studying freshmen students during the 1956-57 academic year at twenty institutions of higher education in the United States, Iffert and Clarke reported that more than 45 percent of the dropouts attributed their withdrawal to academic difficulties.[45] Conner was interested in freshmen attrition at Southern Methodist Univeristy. He found that for the one hundred students studied, freshman GPA was an important factor in attrition; those with low grade point averages tended to drop out.[46] Baber and Caple's data demonstrated that persisters had significantly higher first year GPA's, School and College Ability Test scores, and high school grades than did nonpersisters.[47] Cope[48] and other researchers[49] also have reported poor grades to be a pressing reason for dropping out of school.

Poor college performance did not account for all dropouts. Consequently, many researchers attempted to identify factors which distinguished between adequately and inadequately achieving dropouts and/or persisters. High school records and test scores were most often investigated in this regard. Vaughan studied SAT scores of students who withdrew voluntarily, were dismissed because of low grades, or persisted at the University of San Francisco. He found that for those who withdrew voluntarily, SAT Mathematics and Verbal scores averaged fifteen points lower than the persisters' scores; while the SAT scores of the dismissed students averaged forty-five points lower than the persisters' scores.[50] A study of 275 men and 134 women at the University of Illinois divided students into the following categories: graduates (G)--graduated in five years; achieving withdrawals (AW)--had a C average or better; nonachieving withdrawals (NW)--were on probation or without grades when they withdrew; and failures (F)--were dismissed for academic failure. For high school percentile rank (HSPR) and American College Test (ACT) scores there were no significant differences between the graduates and the achieving withdrawals, nor between the nonachieving withdrawals and the failures. However, both the G and AW groups had higher ACT scores and HSPR's than the NW and F groups.[51] Hoffman compared three groups of students at Manchester College: those who remained, those who transferred, and those who withdrew. He found that the continuers and transfers were similar in aptitude, educational background, and college academic performance. However, the withdrawers differed from these groups in that they had lower high school ranks, lower SAT Mathematics scores, and lower GPA's. The three groups did not differ on personality tests or SAT Verbal and Total scores.[52] Additional studies also have revealed that students who drop out rather than transfer tend to have lower high school grades and lower achievement/aptitude test scores than students who persist.[53]

In summary, the majority of data has suggested that students who persist, transfer, drop out, or flunk out can be discriminated on the basis of high school grades (or rank) and/or standardized test scores. These results were not unexpected. Since student college performance, that is, GPA, has been a major reason for attrition[54] and high school and test performances have been relatively reliable predictors of college achievement,[55] it follows that these measures should be able to distinguish between low and high achieving students who withdraw or persist. In conclusion, college GPA, high school grades, and achievement/aptitude test scores have been identified as variables strongly related to college attrition, "but no one or two neatly packaged predictors of attrition have been found."[56]

FACTORS RELATED TO ACADEMIC ACHIEVEMENT AND ATTRITION

The research literature has generally indicated that 1) high school grades and standardized test scores are the best predictors of academic achievement in college and that 2) college grade point average is a major determinant of college attrition. While these relationships have been relatively stable for the majority of students, they appear to waver with students having culturally different backgrounds.[57] There have been many other factors which were instrumental in altering the validity of high school performance, entrance examinations, and college performances.[58] This section discusses the effects of some of the related factors:

Socioeconomic Level: Economically Disadvantaged

Minority: Race

Sex

Marital Status

Financial Aid

Employment

Special Programs

Socioeconomic Level: Economically Disadvantaged

Much of the research considering student socioeconomic level focused on students from lower socioeconomic levels; many of these disadvantaged students belonged to minority groups.[59] It has been difficult to separate the effects of social class from racial and/or ethnic considerations. Consequently, much of the research literature discussed in this section is appropriate for minority students as well.

Socioeconomic level has been shwon to be related to student: choice of college;[60] college attendance;[61] standardized test scores;[62]

college success;[63] and college persistence and withdrawal.[64] Many of the studies in this area compared students from higher income and lower income families on the same variables. The research findings have suggested that the prediction of college success may be enhanced if student socioeconomic level is considered.

The accessibility of higher education has been a definite concern when discussing economically disadvantaged persons.[65] Lane indicated that poor (and minority) students typically were sparsely represented in institutions of higher education and participated "largely through special programs with group specific dispensation."[66] Trent's five year longitudinal study of 10,000 high school seniors, representing thirty-seven schools in the country, revealed that socioeconomic status was more important than ability in determining college entrance.[67] A similar study of 9,000 Wisconsin high school seniors demonstrated that high socioeconomic class was more important than high intelligence in determining college attendance.[68] Nam's paper analyzed social class disparities in various educational programs. He found that students from high income homes were highly overrepresented in the universities.[69] However, this may not be as true as it once was because of the increased distribution of financial aid awarded on the basis of need.[70]

Standardized test scores of students from low income families have been compared with those of high income students; variable results have been reported. Merritt's investigation of work-study students revealed that students from low income families had significantly lower ACT scores than the comparison group of upper socioeconomic Greek fraternity and sorority students.[71] The relationship of family income to several student variables was studied by Baird. He used a representative sample of 3 percent of the 612,000 college-bound students tested by the American College

Testing Program during a one year period. His data indicated that the lowest ACT scores in the sample were for the students with the lowest family incomes. However, those same persons had the highest average high school grades. He concluded that his findings demonstrated a tendency for this group to overachieve.[72] Rhodes and Caple compared 233 Educational Opportunity Grant (EOG) students with 231 nonEOG classmates on School and College Ability Test (SCAT) scores and high school rank. Their data suggested that the students from low socioeconomic backgrounds did as well as their counterparts from high socioeconomic backgrounds.[73] DeBlassie and Boswell discussed the problems of disadvantaged students and the use of entrance tests with such students. They reported that standardized tests were negative experiences for these students and, therefore, not very reliable.[74] Thus, it appeared that low socioeconomic status has been associated with low scores on general achievement/aptitude tests.

Socioeconomic level has been shown to be related to college achievement. Previous research studies have documented that high grades were associated with high income family background.[75] Recent studies have reported less uniform results. Binford attempted to the study the relationships between socioeconomic status, academic achievement, and intelligence. She found that a significant relationship existed between intelligence tests and socioeconomic status; between intelligence tests and academic achievement (grades); and between socioeconomic status and academic achievement, with intelligence controlled.[76] A demographic study of a freshmen class at Auburn University identified women from low income families as receiving the best grades and men from high income families as achieving the worst grades.[77] Worthington and Grant's analysis of factors of academic success for 1270 men and 990 women at the University of

Utah disclosed that family income had a main effect on college GPA.[78] From a comparison of public and parochial high school graduates, college freshman GPA was shown to have no significant correlation with socioeconomic status.[79] Miller, in his comprehensive review of the literature, concluded that social class was one of the least influential variables affecting academic performance. With regard to achievement, he posited that

> Social class per se does not in itself account for differences. . . what matters is not the social class from which the person originates but rather it is the characteristics of the person and his social environment which influence his attainment.[80]

Low socioeconomic background has been shown to be related to dropping out.[81] Sewell analyzed data gathered from 9,000 students grouped according to socioeconomic status (SES) and ability; he noted large differences between the groups in their chances of graduating from college. In the lowest ability group the probability of graduating was nine times greater for high SES students than for low SES students.[82] Thus, it appeared that high income students have had a greater chance of remaining in school than low income students.

In summary, it appeared that socioeconomic level has been directly related to college accessibility--low income students were less likely to attend college. Generally, the research literature has shown that low socioeconomic level is associated with: lower general achievement/aptitude test scores; variable college success; and a higher dropout rate.

Minority: Race

The research literature discussing the prediction of college success has often considered minority-background as a variable. This section deals primarily with racial minorities, predominantly Negroes. Minority persons have been disproportionately represented at the lower end of the economic continuum.[83] The distribution of 1968 family income was:[84]

	White	Non-White
under $5,000	20%	45%
$5,000-$9,999	38	35
$10,000-$14,999	26	15
$15,000 and over	16	6

Similar results were found for the distribution of family incomes of Black college students. A 1969-70 survey of 3,363 college sophomores indicated that "83 percent of black college students come from families earning less than $10,000 per year, while 36 percent of white students come from such backgrounds."[85] In 1970, Brandson reported comparable results: 75 percent of Black freshmen and 30 percent of White freshmen came from families having incomes under $8,000.[86] Therefore, Black students were often equated with disadvantaged students, especially since lack of money was one of their major problems.[87] As a result, much of the literature discussing economically disadvantaged students was appropriate for racial/ethnic minority students.[88] However, though the effects of social class and ethnicity on academic performance appeared highly correlated, a few reports suggested that ethnicity (race) accounted for a greater part of the variance.[89]

Gordon traced the history of accessibility of higher education for Blacks and noted that progress had been made since the middle 60's and the development of the National Defense Education Act.[90] However, as of the fall of 1970 it was estimated that only 5.8 percent of the students in higher education were Black Americans.[91] This represented 2.0 percent of the Black American population.[92] Comparable figures for White students were 93.2 percent,[93] and 4.3 percent,[94] respectively. While racial considerations may rarely deny admission to an institution today, it has been suggested that there are indirect barriers which prevent access to higher education,[95] for example, selection criteria.[96]

Institutions of higher education have traditionally used standardized tests and high school grades as part of their selection criteria because they have been relatively reliable predictors of college success.[97] However, admissions officers have been warned that these tests are culture bound[98] and may have built in sex and ethnic biases.[99] A search for Black academic talent, initiated with the development of the National Scholarship Service and Fund for Negro Students, ended in failure because of the limited number of students who could meet the traditional admission standards.[100] Hall noted that Negroes showed significantly lower aptitude and achievement scores than Whites, but there were no significant differences between the two groups in terms of motivation.[101] In a study of test construction, Green concluded that test item selection was biased against persons belonging to certain racial and ethnic groups, that is, those groups not similar to the majority of persons in the tryout samples.[102] Crossland stated that

> Virtually every test that purports to measure educational aptitude or achievement reveals that the mean of the scores of minority youth is about one standard deviation below the mean of the rest of the population.[103]

Bowles and DeCosta presented smilar data.[104] Consequently, the predictive validity of standardized tests for minority college students has been questioned and studied.

Several reports have suggested that even though tests may be biased against minority students, they are still valid predictors of these students' achievement.[105] Pandey demonstrated that School and College Ability Test (SCAT) percentile ranks of Blacks and Whites were significantly different (in favor of Whites) and in the same direction as the students' mean GPA's.[106] The Kendrick Report included data which indicated that the average SAT Verbal scores of Negroes were considerably below those of Whites. However, since many colleges evaluated students on their verbal ability, the test scores were able to predict the grades of Negro students.[107] Stanley and Porter[108] presented data which supported findings of previous studies[109]--that the grades of Negro students were as predictable as those of Whites when no special treatment was involved. While Flaugher[110] and others[111] reported several sources of test bias against minority groups, for example, test content not relevant to their background--they also acknowledged that standardized tests seemed to predict validly academic achievement regardless of student background.

Many investigative reports of the prediction of success of minority students have considered the type of institution attended, in part, because Negroes attending traditionally White institutions tend to have significantly higher test scores than Negroes attending traditionally Black institutions.[112] Stanley,[113] Roberts,[114] and Astin[115] determined that the predictive power of standardized tests for Negroes at Black universities was the same or better than at White universities. Studying Negroes and nonNegroes, Temp investigated the predictive ability of the SAT at thirteen integrated institutions. The separate regression equations for Blacks and Whites differed significantly at ten of the thirteen institutions. Regression equations suitable to the majority of students at a given college tended to overpredict (inaccurately predict higher grades) for the Blacks at twelve of the thirteen institutions.[116] Similar studies at traditionally White universities yielded comparable results.[117] Davis and Temp studied SAT bias with regard to GPA prediction for Blacks and Whites at nineteen universities. At six colleges, the predictive validity of the SAT was biased against Blacks; at seven colleges the bias was in favor of Blacks.[118] Reviewing SAT scores at integrated colleges, Clark and Plotkin concluded that they either failed to predict or underestimated the performance of Negroes.[119] Borgen considered the predictive relationships between National Merit Scholarship Qualifying Test (NMSQT) scores and freshmen grades for Blacks at five types of colleges. When grouped according to type of college attended, statistically significant correlations were reported. However, when all students and colleges were studied as one combined group, a zero order correlation resulted between NMSQT scores and grades.[120] Thus, the results have been contradictory; however, it appeared that the predictive power of standardized tests for Blacks has been greater at Negro institutions, and at White institutions which have developed separate regression equations for Blacks and Whites.

A few investigators have considered Black student attrition. Jaffe and Adams determined that "only 40-50% of non-whites who entered college completed their undergraduate study."[121] Egerton[122] and Astin[123] concluded that the attrition rate for Black freshmen was usually higher than for White freshmen. However, Clark and Plotkin reported that the Negro dropout rate at segregated colleges was about equal to that of White students.[124] Davis, Loeb, and Robinson found that significantly more Negroes than nonNegroes had withdrawn from the University of Illinois after one and two years of attendance.[125] Astin reported that the predicted attrition rate (based on test scores) for White students tended to be accurate, but for Black students at White institutions the attrition rate was less than predicted.[126] Perhaps Black attrition was related to the racial makeup of the student body, but it is problematic, and may have been related to special support programs.

In summary, minority access to higher education has been limited indirectly by the use of traditional selection criteria, especially standardized test scores.

> Such tests are empirically established measures for the prediction of academic performance, though they are often

> assailed as carrying a built-in cultural bias. The charge of bias is true in that the tests are related to dominant, i.e., white, cultural patterns.[127]

It also has been true that these tests generally tend to accurately measure a person's ability to do quality work in college.[128] "In other words, culturally biased or not, the tests are all too accurate in their measurement of any handicap with respect to college preparation."[129]

It has been noted that the predictive validity of entrance tests for Black achievement and attrition varies with the racial makeup of the institution's student body and the population employed to develop regression equations. The research literature generally suggested that Negroes at predominantly White institutions tend to: 1) obtain higher test scores than Negroes at traditionally Black institutions; 2) obtain lower test scores than Whites at predominantly White institutions; and 3) obtain grades in keeping with their test scores, that is, lower grades than Whites,[130] if they are not participating in special programs. On the basis of the research literature, race should be considered when attempting to predict success at college. Separate regression equations for Blacks and Whites have been recommended to enhance the validity of predictions made from standardized test scores.[131]

Sex

Several studies have been reported which indicated sex differences in scholastic abilities[132] "but these have generally been regarded as evident sex differences in acquired aptitudes, for example, women do better in language, men in arithmetic, etc."[133] College attendance has been shown to be related to sex. Adams and Meidam indicated that among daughters of blue collar workers the chances of attending college diminished with each additional brother.[134] Young[135] and Walster, Cleary, and Clifford[136] determined that college and university admission procedures discriminated against women, especially at the low ability levels.[137]

Studies which investigated various criteria for predicting academic success have revealed sex differences.[138] Borup disclosed that the ACT had a built-in sex and ethnic bias in favor of male, Anglo-Americans,[139] whereas Foster and Jenkins demonstrated that women earned higher English scores and lower mathematic scores than men on the same test.[140] Boyd found that correlation coefficients between several individual measures and academic success for men and women ranged from .400 to .581 and from .379 to .609, respectively.[141] Irvine,[142] Lindsay and Althouse,[143] and Michael and others,[144] reported that correlations between traditional predictors and college success were higher for women than men. Correlation coefficients between SAT scores and college grades were studied over a three year period for freshmen who attended predominantly nonNegro co-educational colleges. Analyses of variance indicated that the three main effects of sex, year, and college made significant contributions to the variance, with sex contributing 50 percent. The correlation coefficients obtained were consistently higher among women.[145] Flora found that the academic success of college men could be predicted from high school averages, but in order to predict the success of college women, verbal test scores were necessary.[146] Siegelman presented data to support the conclusion that the predictive validity of SAT scores increased for women over a four year period, but the test scores were not valid for men over the same period. However, high school average predicted equally well for both sexes.[147] A similar study by Bowers, using SCAT scores, high school percentile rank, and first semester GPA, revealed different conclusions, namely, SCAT and HSPR were better predictors for men and women, respectively.[148] Langen found that separate regression equations for each sex were no more efficient than the traditional single equation in which sex was a variable.[149]

Sex also appeared to affect the degree to which test scores were able to predict college grades for disadvantaged and minority students. Buszek determined that the California Achievement Test was the best predictor of grades for Negro men and the total group; whereas the Otis Intelligence Test was the best predictor of grades for Negro women.[150] Studying disadvantaged minority students, Cherdack reported that SAT Verbal correlations with college GPA were generally higher for minority and White females than for their male counterparts.[151]

In terms of college success, several studies have demonstrated that women receive higher grades relative to their ability[152] and are more likely to graduate within a four year period than men.[153] Hill's five year longitudinal study of attrition at the University of Texas indicated that more women than men left voluntarily but more men than women were dismissed for poor academic achievement, that is to say, flunked out.[154] Cope reported on the differences found between men and women as they related to attrition. Women who dropped out tended to be less cultured, less physically attractive, and less verbally inclined. These factors seemed to be unrelated to attrition among men.[155] Several reports have recorded that women had higher dropout rates than men.[156]

In summary, sex differences have been documented in college attendance, grades, and attrition. Low ability women have found it more difficult to enter institutions of higher education. Women in college, in terms of academic average, have tended to do better than men but this is probably the result of selection procedures. Women also have been reported to have higher dropout rates. On the basis of the research literature, predictions of achievement and attrition may be enhanced when sex is taken into consideration.

Marital Status

The incidence of married undergraduate students on campus has been approximately 20-25 percent[157] and has prompted several researchers to investigate the effects of marital status on college success. As a result, marital status has been shown to be related to college: attendance,[158] achievement,[159] and attrition.[160]

Marriage seems to have inhibited college attendance. Iffert and Clarke reported that females who were accepted to a university or college but did not attend were typically prevented by marriage.[161] Watley indicated that marriage was definitely a factor in college attendance, especially for women and nonBlacks. In this instance, sex was more important than race, that is, a married woman, regardless of race, was less likely to attend college than a married man; and marriage seemed a greater barrier for nonBlack men than Black men.[162] Bayer's survey of 324 institutions supported Watley's data, namely, that Blacks were more likely to be married than Whites.[163] The majority of women whose husbands were students did not attend school.[164] Among high ability women, marriage may be delayed to allow for education.[165]

Marriage has not seemed to have had a negative effect on achievement. Eshleman and Hunt revealed that lower class men often felt that marriage was helpful in achieving good grades.[166] Klein and Snyder's investigation disclosed that marriage was positively related to achievement.[167] Watley reported that grades were unaffected by marital status with one exception--single, White males made higher grades than their married cohorts.[168] Thus, married students generally may be expected to earn grades which are comparable to those of single students.

Financial[169] and emotional[170] problems often have been associated with student marriages. Consequently, it was not surprising that marriage seemed to be related to attrition. The majority of studies have indicated that marriage is a frequent reason for dropping out[171] and that more married than single students discontinue their education.[172]

In summary, marital status has not seemed to have had a significant effect upon achievement but has been strongly related to college attendance and attrition. Marriage has been negatively associated with college attendance, especially for women and more so for Whites than Blacks. Married students also have been more apt to drop out, but this may be associated with financial and emotional difficulties.

Financial Aid

Lack of money has been identified as one of the barriers to higher education and as a significant variable related to attrition.[173] For example, in a study of twenty universities, it was found that two thirds of the students who were admitted but did not enroll, were unable to enroll because of financial reasons.[174] Fox presented questionnaire data from 2,037 students who had withdrawn from twenty-one liberal arts colleges in the same one year period. He reported that financial considerations was one of the most common reasons stated for withdrawal;[175] Demos,[176] Kester,[177] Yuker, Lichtenstein, and Witheiler,[178] Iffert,[179] and Summerskill[180] reported similar results.

Although once distributed on the basis of scholarship, financial aid is presently awarded primarily on the basis of need.[181] Billions of dollars in federal money have been appropriated for students each year.[182] Consequently, the effectiveness of financial aid has been investigated.

A number of studies have considered the relationships between financial aid, college success, and college persistence/attrition. Kinney's doctoral dissertation at Washington State University investigated the effect of scholarship aid on academic achievement and persistence. Two groups of students (scholarship aid recipients, and nonrecipients) were equated in number and matched for age, sex, marital status, first year cumulative GPA, total credits earned, and major field of specialization. No significant differences in achievement or persistence were found between the groups. The variables of financial aid and financial need were not significant for either achievement or persistence.[183] A study of students from different socioeconomic backgrounds disclosed that the low income group had a significantly higher persistence rate than the rest of the freshmen class. However, it could not be determined if persistence was related to social class, or to the fact that all low income students were receiving Educational Opportunity Grants.[184] Astin and others compared disadvantaged students (family income below $6,000) and nondisadvantaged students attending the same university. While both groups had comparable high school and college records, different factors affected their persistence and satisfaction. The disadvantaged students were more likely to persist if they were recipients of some kind of financial aid.[185] A Hofstra University study also demonstrated that financial aid seemed to enable students to persist. The percentage of dropouts receiving aid was much smaller than the percentage of dropouts not receiving financial aid.[186]

In summary, financial aid has been a major means of enabling greater student access to higher education. It appeared that financial aid may not have directly enhanced academic achievement but students receiving assistance exhibit a higher persistence rate. It is important to note that low income students exhibit a higher persistence rate when they have been awarded financial aid.

Employment

Several reports have suggested that the majority of students are employed at some time during their undergraduate careers.[187] As a result, researchers have investigated the effects of employment, the number of hours employed, and the type of employment, on student achievement. Many low income, financial aid recipients have been employed;[188] however, not all employed students have been financial aid recipients.[189] Consequently, the main effects of employment and the interaction effects of financial aid and employment on college achievement have been investigated. A discussion of employment and college success is presented first.

Part-time work, per se, has not seemed to have affected student achievement negatively. A comparison of working (up to twelve hours per week) and nonworking freshmen at the University of North Dakota determined that employment was not significantly related to first semester grade point average.[190] Hay and Lindsay at Pennsylvania State University conducted two studies involving employed and unemployed baccalaureate degree and associate degree students. Study I data identified employed men and women baccalaureate degree students as earning lower GPA's, relative to their aptitude, than their unemployed comparisons. Study II findings revealed no significant differences between the GPA's of any of the groups.[191] Students divided into three ability groups on the basis of high school rank and SCAT scores were studied at the University of Missouri. Henry reported that the working and nonworking students did not differ in first semester academic perfomance in any of the ability groups.[192] Baron found that the chances of college success were greater if the student planned to work part-time.[193]

The majority of the research literature indicated that the number of hours a student works and the relevancy of his job to his major course of study affect academic achievement. A study involving full-time students compared those persons employed for fifteen or fewer hours, those employed for sixteen or more hours, and those unemployed. Students who worked were able to achieve better grades if they worked in a field relevant to their major. Employed students were able to maintain grades comparable to unemployed students if they limited employment to fifteen or fewer hours; working more than fifteen hours per week resulted in poorer grades.[194] Similar results were reported by Hay and Lindsay,[195] Augsberger,[196] and Hay, Evans, and Lindsay.[197] Thus, part-time employment, relevant to one's major, of less than sixteen hours per week has not had a negative effect upon college performance, and in some cases has been shown to facilitate achievement.

Financial assistance has often involved employment, for example, work-study programs;[198] consequently, the combined effects of employment and financial aid on college performance have been researched. The effects of holding a work-study job (of not more than fifteen hours per week) on the academic achievement of first semester freshmen at the University of South Carolina were studied by LeGrand, Piercy, and Panos. Twenty-seven work-study students were matched with twenty-seven nonworking students for the following variables: predicted GPA, sex, college enrolled in, number of hours carried, residency, and marital status. No significant difference between the mean GPA's of the work-study and nonworking students was reported.[199] Kelly's dissertation considered the effects of various types of financial aid (including those which required employment) on academic achievement. He found the achievement of students whose financial aid involved part-time work did not differ significantly from those students whose assistance did not include employment. However, those financial aid recipients with gift aid tended towards higher grades.[200] His findings were not surprising since most gifts were awarded on the basis of scholarship, as well as need.[201] Kaiser and Bergen matched three groups of first semester freshmen (employed financial aid recipients, unemployed financial aid recipients, and unemployed persons not receiving financial aid) for sex, ACT Composite scores, high school GPA, and college semester hours completed. They reported that the three groups did not differ significantly in terms of college GPA.[202] Thus, the achievement of financial aid recipients has not been impaired by a moderate amount of employment.

In summary, a large number of students have been employed during their undergraduate years. Many low income financial aid recipients have been employed part-time with no ill effects in terms of grade point average. It appeared that part-time employment of fifteen hours or less has not had a negative effect on achievement, irrespective of financial aid.

Special Programs

Many colleges and universities have had special programs for regular students with deficient skills. These programs typically involved improving various reading skills (vocabulary, comprehension, speed) and study skills.[203] Many disadvantaged/minority students were educationally deprived.[204] Consequently, the increased recruitment and admission of these students during the 1960's[205] led to the development of many more special programs.[206] Programs for disadvantaged/minority students usually followed set approaches,[207] especially a remedial approach or a "cultural approach." The latter often included community field projects and an emphasis on Black culture and urban problems.[208] The relative success of special programs and the predictive ability of tests for disadvantaged/minority students enrolled in these programs is discussed in this unit.

College reading program evaluations have used various criteria, for example, improved reading skills,[209] courses failed,[210] grade point average,[211] grades in verbal courses,[212] dropout rate.[213] Extremely variable results have been reported with regard to the programs' success depending upon the criteria considered;[214] the methods, materials, and mechanical devices used;[215] and the permanence of gains.[216]

The special compensatory and cultural programs developed for marginal admission and/or disadvantaged/minority students have been evaluated on several criteria--attrition rate,[217] grades,[218] change in grade point average,[219] matriculation rate,[220] study habits,[221] number of courses dropped,[222] and social adaptation.[223] Many students in these programs were considered "high risks," thus, attrition rate was the most commonly employed criteria. The literature seemed to warrant the "high risk" descriptor for disadvantaged/minority students, as well as for marginal admission students.[224] Ziegler described disadvantaged students as being "culturally different and intellectually, economically and socially disadvantaged."[225] Many special program recruits resented White university tokenism[226] and often felt alienated on campuses which displayed and perpetuated White, middle class standards and values.[227] While there was usually a period of adjustment for all freshmen, adjustment may have been especially difficult for these students,[228] in part because they often had to learn new and different patterns of behavior.[229] Even though financial assistance was often provided for tuition and books, money problems of everyday living still existed.[230] Pressures of this nature were not conducive to learning and placed these students in a tenuous position on campus.[231] Thus, dropout rate may have been a good indicator of a program's success.

Programs evaluated in terms of persistence or attrition rate usually revealed favorable results when compared to: 1) previous attrition rates of disadvantaged persons,[232] 2) attrition rates of the university as a whole,[233] 3) initial number of program participants,[234] and 4) attrition rate of a control group.[235] However, there were some programs which were considered unsuccessful with regard to attrition but were successful on other criteria,[236] for example, number of courses dropped by program participants.[237]

Studies which considered the academic achievement of students in special programs report variable results. Hendrix found that after one semester of special advising, participants in a special program were able to achieve GPA's which were higher than any of the control groups, that is, high risk students not participating in the program, usual freshmen who attended a pre-orientation session, and usual freshmen who did not attend the pre-orientation session.[238] Raymer reported that experimental students enrolled in a compensatory program for one trimester had significantly lower GPA's the following trimester when they were no longer receiving supportive academic services. She suggested that the decline in mean GPA's for the experimental group was attributable to the lack of academic supportive services for the second trimester, even though almost all subjects received financial aid both trimesters.[239] Somerville's study of Berkeley's Educational Opportunity Program revealed that in the first year of the program 45 percent of the high risk freshmen were able to achieve C or better averages; 51 percent of all entering freshmen had comparable grades.[240] Hall compared the cumulative GPA's and changes in GPA's of disadvantaged students receiving supportive services (including financial assistance) and those receiving only financial assistance. There were no significant differences between the groups in terms of 1) GPA change for the Autumn quarter or the Winter quarter, and 2) cumulative GPA's for the Autumn _and_ Winter quarters. However, significant differences, in favor of students receiving supportive services, were reported between the groups in terms of 1) GPA change for the Spring quarter, and 2) cumulative GPA's for the Autumn, Winter _and_ Spring quarters.[241] Heath's investigation of the High Potential Program (HPP) directed toward poor Blacks at Illinois State University revealed that the HPP participants who disapproved of the program the most were the most academically successful.[242] After four semesters of operation, Heinkel reported no significant differences between the GPA's of 122 special program participants and 128 control subjects.[243] Whereas Brown and others disclosed that 111 high risk experimental subjects who received special counseling had significantly higher grades than 111 high risk control subjects.[244] The National College of Education developed a special program for high risk students called the National Orientation Workshop (NOW). After one term it was reported that only eleven of the thirty-six participants were on probation and most of the participants were engaged in campus activities.[245]

Several special programs for disadvantaged students were preparatory in nature and were considered successful if participants completing the course matriculated at the university. Bucklin and Bucklin,[246] Riess,[247] Pearce,[248] Freedman and Myers,[249] and Melnick[250] reported higher than average matriculation rates of disadvantaged/minority students resulting from special programs. Programs evaluated in terms of study habits and social adaptation of high risk students also showed favorable results.[251]

The prediction of achievement by traditional measures for disadvantaged/minority students enrolled in special programs has been difficult. Bowers' comparison of 250 disadvantaged, predominantly Black, freshmen, admitted under reduced admissions criteria, with 5,000 regularly admitted freshmen at the University of Illinois revealed that: 1) for regular courses, high school percentile rank (HSPR) and SCAT scores were more predictive of GPA for the regular than the disadvantaged freshmen, and 2) when the GPA based on regular and special courses was tabulated, HSPR and SCAT scores predicted equally well for the regular and disadvantaged students.[252] In similar studies it was reported that standardized test scores were more valid predictors for disadvantaged special program participants' GPA's than control or regular students' GPA's.[253] Beasley investigated the prediction of academic success for 572 minority Educational Opportunities Program (EOP) participants at the University of Colorado. The ACT Composite correlated significantly (<.05) with first semester GPA and cumulative GPA for the total EOP participants and for the Black and the Mexican American EOP component program participants.[254] Egerton's report of "high risk" minority and poverty students stated that despite low incomes and low test scores, high risk students often matched their classmates' performance.[255] Beach reported that high school grades, SAT scores, and rank in graduating high school class were of no use in predicting first year cumulative GPA of marginal entrants.[256] Forty-six men and thirty-two women entering a special education program (SEP) for minority students at the University of Washington were matched with forty-nine men and thirty-four women nonSEP students who were closest to them in test scores on the Washington Pre-College Aptitude-Achievement Test Battery. While the SEP group had lower test scores, both groups were "high risk." After three quarters at the university the groups were compared in terms of GPA. The nonSEP group performed at their predicted level; the SEP group did much better than predicted. However, GPA variation was greater for the SEP students, as was the dropout rate.[257] A study of 343 College Readiness Program students (95 percent Negro) at the College of San Mateo determined that neither high school grades nor SCAT scores were able to predict college performance.[258] Hammond and Rosick[259] and Hodges[260] reported comparable results. Cherdack's study of the predictive validity of SAT scores in a special education program revealed that the SAT Verbal score was a more consistent positive predictor for White students than for disadvantaged/minority students.[261] On the basis of the research literature, the prediction of success for special program disadvantaged and/or minority participants by traditional measures has been a speculative procedure.

In summary, special programs developed for regular students with minor academic deficits often have been remedial and have involved reading skills. Variable results were reported depending on the evaluative criteria used. Special programs for "high risk" students, that is, disadvantaged/minority students and/or marginal admission students, were typically remedial in nature. But often there were programs for disadvantaged/minority students which emphasized their cultural background (especially for Blacks). Attrition rate was the most common criterion used to evaluate special programs for disadvantaged persons; the majority of studies reported impressive results (compared to the alternative of no special programs). Studies which evaluated the academic achievements (grades) of special program participants reported variable results. It appeared that while special programs are able to keep high risk disadvantaged/minority students in school, they may not enhance these students' ability to learn independently. The predictive use of general achievement/aptitude tests has been problematic with students enrolled in programs designed to offset deficits. Typically, the test scores of students participating in special programs have underestimated performance.

NOTES AND REFERENCES

[1] J. M. Stalnaker, "American Council Psychological Examination for 1926 at Purdue University," School and Society, 27:86-88, Jan., 1928.

[2] Stalnaker, ibid.; see also A. W. Kornhauser, "Test and High School Records as Indicators of Success in an Undergraduate School of Business," Journal of Educational Research, 16:342-356, Dec., 1927.

[3] Ibid.

[4] Kornhauser, ibid.; see also M. J. Nelson and E. C. Denny, "The Terman and Thurstone Group Tests as Criteria for Predicting College Success," School and Society, 26:501-502, Oct., 1927.

[5] W. F. Book, "How Well Can College Students Read?" School and Society, 26:242-248, Aug., 1927.

[6] Stalnaker, loc. cit.

[7] Ibid.

[8] H. A. Landry, "The Relative Predictive Value of Certain College Entrance Criteria," Journal of Experimental Education, 5:256-260, March, 1937.

[9] M. J. Nelson, "Some Data from Freshmen Tests," School and Society, 31:772-774, June, 1930.

[10] S. B. Schmitz,"Predicting Success in College: A Study of Various Criteria," Journal of Educational Psychology, 28:465-473, Sept., 1937.

[11] N. B. Preas, "A Study of the Relationship Between Selected Variables and Academic Achievement in a Community College" (North Carolina University, Department of Adult Education, Ed.D. Thesis, 1969), (Washington, D. C.: ERIC Clearinghouse on Adult Education, Oct., 1970).

[12] N. S. Cole, Differential Validity in the ACT Tests, ACT Research Report, No. 30 (Iowa City: American College Testing Program, 1969).

[13] J. W. Loeb and D. J. Mueller, "The Use of a Scale of High Schools in Predicting College Grades," Educational and Psychological Measurement, 30:381-386, Summer, 1970.

[14] Commission on Tests, Report of the Commission on Tests: I. Righting the Balance (New York: College Entrance Examination Board, 1970).

[15] Ibid, p. 18.

[16] B. C. Pedrini and D. T. Pedrini, "Reading Ability and Grades: A Brief Review" (unpublished paper, University of Nebraska at Omaha, 1972).

[17] Ibid.

[18] Ibid.

[19] J. A. Wellington, "Factors Related to the Academic Success of Resident Freshmen at a Midwestern Liberal Arts College During the Academic Year 1952-53," Dissertation Abstracts, 16:69, no. 1, 1956.

[20] J. Seegers and H. Rose, "Verbal Comprehension and Academic Success in College," Personnel and Guidance Journal, 42:295-296, Nov., 1962.

[21] D. Neville, "An Exploratory Study Comparing Successful and Unsuccessful University of Florida Students Classified as Average or Poor Readers," Dissertation Abstracts, 22:3525-3526, April, 1962.

[22] M. A. Lanigan, "The Effectiveness of the Otis, the A.C.E., and the Minnesota Speed of Reading Test for Predicting Success in College," Journal of Educational Research, 41:289-296, Dec., 1947.

[23] C. A. Lindsay and R. Althouse, Comparative Validities of the Strong Vocational Interest Blank Academic Scale and the College Student Questionnaire Motivation for Grades Scale, Student Affairs Research Report, No. 68-2 (University Park: Office of Student Affairs, Pennsylvania State University, June, 1968); see also L. L. Baird and J. M. Richards, Jr., The Effects of Selecting College Students by Various Kinds of High School Achievement, ACT Research Report, No. 23 (Iowa City: American College Testing Program, Feb., 1968); see also R. E. Spencer and W. M. Stallings, "The Student Profile Section of the ACT Related to Academic Success," Journal of College Student Personnel, 9:177-179, May, 1968; see also J. W. Fudge, "Predicting Academic Performance From Biographical Data," Dissertation Abstracts International, 32 (7-A):3785, Jan., 1972; see also G. F. Beanblossom, Biographical Survey, Part III: The Use of Biographical Variables in Predicting Grades in Major Field Criterion Areas for UW Freshmen (Seattle: Bureau of Testing, University of Washington, Sept., 1969); see also H. K. Cameron, "Nonintellectual Correlates of Academic Achievement," The Journal of Negro Education, 37:252-257, Summer, 1968; see also C. E. Lunneborg, "Biographic Variables in Differential vs. Absolute Prediction" (unpublished report, University of Washington, March, 1966); see also L. F. Schoenfeldt, "Nontest Variables in the Prediction of Educational Progress" (paper presented at the Annual Meeting of the American Psychological Association, Miami, Sept., 1970), (Washington, D. C.: ERIC Clearinghouse on Tests, Measurement, and Evaluation, 1971).

[24] Fudge, loc. cit.

[25] P. W. Lunneborg and C. E. Lunneborg, "The Differential Prediction of College Grades from Biographic Information" (paper read at American Psychological Association, New York, Sept., 1966).

[26] Beanblossom, loc. cit.

[27] Lindsay and Althouse, loc. cit.

[28] Spencer and Stallings, loc. cit.

[29] Commission on Tests, op. cit., p. 18.

[30] M. K. Morgan, "The OPI, the ACT and University Attrition: A Discriminant Analysis," *Dissertation Abstracts International*, 31 (8-A): 3906-3907, Feb., 1971; see also L. S. Flaum, "Point of View: 'Cop Out'--'Push Out'--'Drop Out': Why?" *Innovation and Innovative Programs*, No. 10, (University of South Carolina, Jan., 1969), pp. 15-19; see also G. W. Miller, *Success, Failure, and Wastage in Higher Education* (London: George G. Harrap, 1970).

[31] S. E. Wood, "Relationship of Certain Nonintellective Factors to Persistence" (Wasington, D. C.: ERIC Clearinghouse on Junior Colleges, 1968); see also R. E. Krebs and P. G. Liberty, Jr., *A Comparative Study of Three Groups of Withdrawal Students on Ten Factor Variables Derived From a 36-Problem Self-Report Inventory* (Austin: University of Texas, Feb., 1971); see also R. P. Vaughan, "Involvement in Extracurricular Activities and Dropout," *Journal of College Student Personnel*, 9:60-61, Jan., 1968.

[32] M. E. Katzell, "Expectations and Dropouts in Schools of Nursing," *Journal of Applied Psychology*, 52:154-157, April, 1968; see also L. F. Robinson, "Relation of Student Persistence in College to Satisfaction with 'Environmental' Factors," *Journal of Educational Research*, 63:6-10, Sept., 1969; see also V. Savicki, H. Schumer and R. E. Stanfield, "Student Role Orientations and College Dropouts," *Journal of Counseling Psychology*, 17: 559-566, Nov., 1970; see also R. G. Cope and R. G. Hewitt, "Types of College Dropouts: An Environmental Press Approach," *College Student Journal*, 5:46-51, Sept.-Oct., 1971.

[33] A. Starr, E. Betz, and J. Menne, "Differences in College Student Satisfaction: Academic Dropouts; Nonacademic Dropouts and Nondropouts," *Journal of Counseling Psychology*, 19:318-322, July, 1972.

[34] E. Knop, "From a Symbolic-Interactionist Perspective: Some Notes on College Dropouts," *Journal of Educational Research*, 60:450-452, July-Aug., 1967; see also G. R. Hanson and R. G. Taylor, "Interaction of Ability and Personality: Another Look at the Dropout Problem in an Institute of Technology," *Journal of Counseling Psychology*, 17:540-545, Nov., 1970; see also H. Hendin, "The Psychodynamics of Flunking Out" (paper read at American College Health Association, Atlanta, April, 1972).

[35] D. J. Prediger, "Application of Moderated Scoring Keys to Prediction of Academic Success," *American Educational Research Journal*, 3: 105-111, March, 1966.

[36] *Who Clears Probation*, Report Series 6, Series No. 1 (Stevens Point: Office of Institutional Research, Jan., 1972); see also P. W. Hoffman, "A Comparative Study of Student Retention and Attrition at Manchester College," *Dissertation Abstracts International*, 32 (2-A):738 Aug., 1971; see also W. C. Blanchfield, "College Dropout Identification: A Case Study," *Journal of Experimental Education*, 40:1-4, Winter, 1971; see also C. I. Chase, "The College Dropout: His High School Prologue," *Bulletin of the National Association of Secondary School Principals*, 54: 66-71, Jan., 1970.

[37] J. Aiken, "A Comparison of Junior College Withdrawees" (Washington, D. C.: ERIC Clearinghouse on Junior Colleges, 1968); see also

W. G. Spady, "Dropouts from Higher Education: Toward an Empirical Model," Interchange, 2:58-62, No. 3, 1971; see also L. Zaccaria and J. Creaser, "Factors Related to Persistence in an Urban Commuter University," Journal of College Student Personnel, 12:286-291, July, 1971.

[38] J. E. Rossman and B. A. Kirk, "Factors Related to Persistence and Withdrawal Among University Students" (paper read at American Educational Research Association, Los Angeles, Feb., 1969); see also D. Trapp, K. Pailthorp, and R. Cope, "Entrance Characteristics and Their Relationship to Types of Student Dropouts," Institutional Research and Institutional Policy Formulation: 11th Annual Forum of the Association for Institutional Research 1971 (Claremont: Office of Institutional Research, Dec., 1971), pp. 119-122; see also A. W. Astin, "Recent Findings from ACE Research Program: Implications for College Choice and Admissions," College and University, 44:341-356, Summer, 1969; see also "Relationship of Academic Predictors to College Success" (Wisconsin State University, Stevens Point, Aug., 1969), (Washington, D. C.: ERIC Clearinghouse on Higher Education, 1969).

[39] V. S. Hardie and S. R. Anderson, Summary of an 'Open' Admission Policy, Personalized Individual Attention, and a Pass-Fail Grading System as Revealed in a Comprehensive Seven-Year Study of 1106 University Freshmen, Research Reports (Washington, D. C.: American Personnel and Guidance Association, 1971), pp. 91-93.

[40] Blanchfield, loc. cit.

[41] Chase, loc. cit.

[42] Trapp, Pailthorp, and Cope, loc. cit.

[43] A. W. Astin, College Dropouts: A National Profile, ACE Research Reports, Vol. 7, No. 1 (American Council on Education, Feb., 1972).

[44] Aiken, loc. cit.; see also Spady, "Dropouts from Higher Education: Toward an Empirical Model," loc. cit.; see also P. Sensor, "Follow-up of 1965 Freshmen Who Did Not Return for Fall Semester, 1966" (Riverside City College, California, May, 1967), (Washington, D. C.: ERIC Clearinghouse on Junior Colleges, 1967); see also R. J. Morrisey, "Attrition in Probationary Freshmen," Journal of College Student Personnel, 12:279-285, July, 1971; see also D. L. Kester, "Further Validation of the Nor Cal Questionnaire: Secondary Validation" (Washington, D. C.: ERIC Clearinghouse on Junior Colleges, Jan., 1972).

[45] R. E. Iffert and B. S. Clarke, College Applicants, Entrants, Dropouts, Bulletin 1965, No. 29 (Washington, D. C.: Bureau of Educational Research and Development, U. S. Office of Education, 1965).

[46] J.D. Conner, "The Relationship Between College Environmental Press and Freshmen Attrition at Southern Methodist University," College and University, 43:265-273, Spring, 1968.

[47] B. B. Baber, Jr. and R. B. Caple, "Educational Opportunity Grant Students: Persisters and Nonpersisters," Journal of College Student Personnel, 11:115-119, March, 1970.

[48] R. J. Cope, "Limitations of Attrition Rates and Causes Given for Dropping Out of College," *Journal of College Student Personnel*, 9:386-392, Nov., 1968.

[49] W. G. Spady, "Peer Integration and Academic Success: Toward A Sociological Model of Undergraduate Attrition" (paper read at the American Educational Research Association, Chicago, Feb., 1968); see also S. Ikenberry, "Factors in College Persistence," *Journal of Counseling Psychology*, 8:322-329, Winter, 1961; see also R. E. Iffert, *Retention and Withdrawal of College Students* (Washington, D. C.: U. S. Office of Education, Government Printing Office, 1958).

[50] R. P. Vaughan, "College Dropouts: Dismissed vs. Withdrew," *Personnel and Guidance Journal*, 46:685-689, March, 1968.

[51] Zaccaria and Creaser, loc. cit.

[52] Hoffman, loc. cit.

[53] W. Hannah, "Personality Differentials Between Lower Division Dropouts and Stay-ins," *Journal of College Student Personnel*, 12:16-19, Jan., 1971; see also C. I. Chase, *The University Freshman Dropout*, Indiana Studies Prediction, No. 6 (Indiana University, Bureau of Educational Studies and Testing, 1965); see also R. G. Cope, "College Press and Dropouts" (paper read at American Educational Research Association, Los Angeles, Feb., 1969); see also B. M. Gadzella and G. Bentall, "Differences in High School Academic Achievements and Mental Abilities of College Graduates and College Dropouts," *College and University*, 42:351-356, Spring, 1967; see also K. B. Daniel, "A Study of College Dropouts With Respect to Academic and Personality Variables," *Journal of Educational Research*, 60:230-235, Jan., 1967; see also H. A. Rose and C. F. Elton, "Attrition and the Vocationally Undecided Student," *Journal of Vocational Behavior*, 1:99-103, Jan., 1971.

[54] Aiken, loc. cit.; see also Spady, "Dropouts from Higher Education: Toward an Empirical Model," loc. cit.; see also Kester, loc. cit.; see also Morrisey, loc. cit.; see also Sensor, loc. cit.

[55] See the Prediction of Academic Achievement section of this chapter.

[56] M. Morgan, op. cit., p. 3906-A.

[57] W. Ihlanfeldt, "Subtleties in College Selection," *Journal of the National Association of College Admissions Counselors*, 15:3-4, May, 1970; see also D. A. Dudley, "College Entrance Tests and the Disadvantaged Student," *National ACAC Journal*, 13:13-15, Feb., 1969; see also R. W. Pitcher, *Challenges to Common Concepts of Potential* (Berea: Educational Development Center Institute on Underachievement, 1969); see also A. W. Astin, "Racial Considerations in Admissions," *The Campus and the Racial Crisis: Background Papers for Participants in the 1969 Annual Meeting of American Council on Education* (Washington, D. C.: The Council, 1969), pp. 65-93; see also R. Nunez, "Recruitment and Admission of Minority Students: The Glaring Reality," *The Minority Student on Campus: Expectations and Possibilities*, eds. R. A. Altman and P. O. Snyder (Boulder: Western Interstate

Commission for Higher Education, 1971), pp. 127-140.

[58] Miller, loc. cit.

[59] H. P. Brandson, "Financing Higher Education for Poor People: Fact and Fiction," College Board Review, 77:5-9, Fall, 1970; see also F. E. Crossland, Minority Access to College, A Ford Foundation Report (New York: Schocken, 1971); see also B. C. Pedrini and D. T. Pedrini, "Intelligent Intelligence Testing" (University of Nebraska at Omaha, 1972), (Washington, D. C.: ERIC Clearinghouse on Tests, Measurement, and Evaluation, 1973); see also "Academically Disadvantaged Minority Group Students in Public Two Year Colleges" (Pennsylvania State Department of Education, Harrisburg, Bureau of Curriculum Development and Education, Oct., 1971), (Washington, D. C.: ERIC Clearinghouse on Junior Colleges, April, 1972).

[60] L. L. Baird, Family Income and the Characteristics of College Bound Students, ACT Research Reports, No. 17 (Iowa City: American College Testing Program, Feb., 1967); see also P. Gurin and E. Epps, "Some Characteristics of Students from Poverty Backgrounds Attending Predominantly Negro Colleges in the Deep South," Social Forces, 66:27-40, Sept., 1966.

[61] W. H. Sewell and V. P. Shah, "Socioeconomic Status, Intelligence, and the Attainment of Higher Education," Sociology of Education, 40:1-23, Winter, 1967; see also J. W. Trent, "A New Look at Recruitment Policies," College Board Review, 58:7-11, Winter, 1965-66; see also C. Nam, "Group Disparities in Educational Participation and Achievement, IV. Conference on Policies for Educational Growth" (Paris, France, June 3-5, 1970), (Washington, D. C.: ERIC Clearinghouse on Educational Administration, 1971).

[62] Baird, loc. cit.; see also Dudley, loc. cit.; see also R. R. DeBlassie and K. Boswell, "The Culturally Disadvantaged College Student," Journal of the National Association of Women Deans and Counselors, 35:126-132, Spring, 1972; see also L. L. Rhodes and R. B. Caple, "Academic Aptitude and Achievement of Educational Opportunity Grant Students," Journal of College Student Personnel, 11:387-390, Nov., 1969.

[63] L. H. Worthington and C. W. Grant, "Factors of Academic Success: A Multivariate Analysis," Journal of Educational Research, 65:7-10, Sept., 1971; see also W. Moon, The Auburn Student: A Demographic Study of the Freshman Class of Auburn University, 1964-65 (Auburn: Student Counseling Service, Auburn University, 1966); see also A. Dispenzieri, S. Giniger, W. Reichman, and M. Levy, "College Performance of Disadvantaged Students as a Function of Ability and Personality," Journal of Counseling Psychology, 18:298-305, July, 1971.

[64] Sewell and Shah, loc. cit.; see also D. E. Fox, "Presentation of Attrition Study," The Liberal Arts College's Responsibility for the Individual Student, ed. E. J. McGrath (New York: Columbia University Teachers College Press, 1966), pp. 86-120.

[65] Miller, loc. cit.

[66] H. W. Lane, "Admissions Procedures in Transition: Some Interrelations," *IRCD Bulletin*, 5:3, Winter, 1969.

[67] Trent, loc. cit.

[68] Sewell and Shah, loc. cit.

[69] Nam, loc. cit.

[70] M. D. Orwig, *Toward More Equitable Distribution of College Student Aid Funds: Problems in Assessing Student Financial Need*, ACT Research Report, No. 43 (Iowa City: American College Testing Program, 1971).

[71] R. Merritt, "Academic Performance of Work-Study Students," *Journal of College Student Personnel*, 11:173-176, May, 1970.

[72] Baird, loc. cit.

[73] Rhodes and Caple, loc. cit.

[74] DeBlassie and Boswell, loc. cit.

[75] E. D. West, *Financial Aid to the Undergraduate* (Washington, D. C.: American Council on Education, 1963).

[76] K. D. Binford, "An Analysis of the Effect of Intelligence on the Relationship Between Socio-economic Status and Academic Achievement," *Sociological Focus*, 4(4):27-37, Summer, 1971.

[77] Moon, loc. cit.

[78] Worthington and Grant, loc. cit.

[79] J. W. Butzow and C. M. Williams, "College Freshman Achievement of Parochial and Public Secondary School Graduates," *Journal of Educational Research*, 60:215-217, Jan., 1967.

[80] Miller, op. cit., p. 37.

[81] Trapp, Pailthorp, and Cope, loc. cit.; see also Spady, "Dropouts from Higher Education: Toward an Empirical Model," loc. cit.; see also Sewell and Shah, loc. cit.; see also E. L. Wegner and W. H. Sewell, "The Relation of Type of College Attended to Graduation" (paper read at American Sociological Association, Boston, Aug., 1968); see also D. H. Kamens, "Social Class, College Contexts, and Educational Attainment: Social Class and College Dropout" (paper read at American Sociological Association, Boston, Aug., 1968); see also R. J. Panos and A. W. Astin, "Attrition Among College Students" (paper read at American Educational Research Association, New York, Feb., 1967).

[82] A. H. Sewell, "Inequality of Opportunity for Higher Education," *American Sociological Review*, 36:793-809, Oct., 1971.

[83] *The Social and Economic Status of Negroes in the United States, 1969* (Washington, D. C.: BlS Report No. 375; Current Population Reports,

Series P-23, No. 29).

[84] Ibid., p. 16.

[85] E. W. Haven and D. H. Horch, "How College Students Finance Their Education," Financial Aid News, No. 8 (New York: College Scholarship Service/College Entrance Examination Board, 1972), p. 8.

[86] Brandson, loc. cit.

[87] S. A. Kendrick, "Minority Students on Campus," The Minority Student on Campus: Expectations and Possibilities, eds. R. A. Altman and P. O. Snyder (Boulder: Western Interstate Commission for Higher Education, 1971), pp. 43-50.

[88] E. H. Epstein, "Social Class, Ethnicity and Academic Achievement: A Cross-Cultural Approach," Journal of Negro Education, 41 (3):202-215, Summer, 1972.

[89] Ibid.; see also R. L. Flaugher and D. A. Rock, "Patterns of Ability Factors Among Four Ethnic Groups," Proceedings of the Annual Convention of the American Psychological Association, Vol. 7 (pt. 1), (Princeton: Educational Testing Service, 1972), pp. 27-28; see also R. L. Flaugher, Patterns of Test Performance by High School Students of Four Ethnic Identities, Project Access Research Report No. 2 (Princeton: Educational Testing Service, 1971); see also A. M. Bindman, "Pre-College Preparation of Negro College Students," Journal of Negro Education, 35:313-321, Fall, 1966; see also M. E. Backman, "Patterns of Mental Abilities: Ethnic, Socioeconomic, and Sex Differences," American Educational Research Journal, 9 (1): 1-12, Winter, 1972; see also E. E. Werner, K. Simonian, and R. S. Smith, "Ethnic and Socioeconomic Status Differences Among Preschool and School-Age Children in Hawaii," Journal of Social Psychology, 75:43-59, 1968; see also G. S. Lesser, G. Fifer, and D. H. Clark, "Mental Abilities of Children from Different Social Class and Cultural Group," Monographs of the Society for Research in Child Development, 30 (4), 1965; see also M. Whiteman and M. Deutsch, "Social Disadvantage as Related to Intellective and Language Development," Social Class, Race, and Psychological Development, eds. M. Deutsch, M. Katz, and A. Jensen (New York: Holt, Rinehart, and Winston, 1968), pp. 86-114.

[90] E. W. Gordon, "Access to Higher Education," IRCD Bulletin, 8:7-10, Feb., 1972.

[91] Crossland, op. cit., p. 13.

[92] Ibid., p. 15.

[93] Ibid., p. 13.

[94] Ibid., p. 15.

[95] Astin, "Racial Considerations in Admissions," loc. cit.; see also Nunez, loc. cit.; see also Crossland, loc. cit.; see also M. J. Archie, "Observations on Minority Group Education," Journal of the Association of College Admissions Counselors, 13:23-25, June, 1968.

[96] L. Berger, "White Coat Versus Cap and Gown" (paper read at American Orthopsychiatric Association, New York, April, 1969).

[97] See the Prediction of Academic Achievement section in this chapter.

[98] Dudley, loc. cit.; see also D. A. Coslin, "What's Wrong with Tests and Testing--Part 1," College Board Review, 65:12-18, Fall, 1967.

[99] J. H. Borup, "The Validity of the American College Test for Discerning Potential Academic Achievement Levels: Ethnic and Sex Groups," Journal of Educational Research, 65:3-6, Sept., 1971; see also R. L. Flaugher, Minority Versus Majority Group Performance on an Aptitude Test Battery, Project Access Research Report, No. 3 (Princeton: Educational Testing Service, Aug., 1971).

[100] Gordon, loc. cit.

[101] J. W. Hall, "The Effects of Supportive Services for Disadvantaged College Students," Dissertation Abstracts International, 32 (7-A):3686-3687, Jan., 1972.

[102] D. R. Green, "Racial and Ethnic Bias in Test Construction. Final Report" (Monterey: CTB/McGraw Hill, Sept., 1971), (Washington, D. C.: ERIC Clearinghouse on Tests, Measurement, and Evaluation, Feb., 1972).

[103] Crossland, op. cit., p. 58.

[104] F. Bowles and F. A. DeCosta, Between Two Worlds (New York: McGraw Hill, 1971).

[105] A. J. Jaffe, W. Adams, and S. Meyers, Negro Higher Education in the 1960's (New York: Praeger, 1968); see also S. A. Kendrick and C. L. Thomas, "Transition from School to College," Review of Educational Research, 40:151-179, Feb., 1970; see also K. M. Wilson, Black Students Entering CRC Colleges: Their Characteristics and Their First-Year Academic Performance, Research Memorandum No. 69-1 (Vassar College: College Research Center, April, 1969).

[106] R. E. Pandey, "The SCAT and Race," Psychological Reports, 28 (2): 459-462, April, 1971.

[107] S. A. Kendrick, "The Coming Segregation of Our Selective Colleges," College Board Review, 66:6-13, Winter, 1967-68.

[108] J. C. Stanley and A. C. Porter, "Correlation of Scholastic Aptitude Test Scores with College Grades for Negroes Versus Whites," Journal of Educational Measurement, 4:199-217, Winter, 1967.

[109] S. C. Davis, J. W. Loeb, and L. F. Robinson, "A Comparison of Characteristics of Negro and White College Freshmen Classmates," Journal of Negro Education, 39:359-366, Fall, 1970; see also D. D. Sampel and W. R. Seymour, "The Academic Success of Black Students: A Dilemma," Journal of College Student Personnel, 12:243-247, July, 1971; see also J. C. Stanley, "Predicting College Success of the Educationally Disadvantaged," Science,

171 (3972):640-647, Feb., 1971.

[110] R. L. Flaugher, "Testing Practices, Minority Groups, and Higher Education: A Review and Discussion of the Research" (Princeton: Educational Testing Service), (Washington, D. C.: ERIC Clearinghouse on Tests, Measurement, and Evaluation, June, 1970).

[111] Bowles and DeCosta, loc. cit.; see also Nunez, loc. cit.

[112] Bowles and DeCosta, loc. cit.; see also J. A. Davis and S. E. Kerner, *The Validity of Tests and Achievement in High School for Predicting Initial Performance in the Public Universities of North Carolina with Special Attention to Black Students*, Report No. PR-71-3 (Princeton: Educational Testing Service, March, 1971); see also R. T. Harnett, "Differences in Selected Attitudes and College Orientations Between Black Students Attending Traditionally Negro and Traditionally White Institutions," *Sociology of Education*, 43 (4):419-436, Fall, 1970; H. W. Lane, "Where do Black Students Go to College and Why?" *National ACAC Journal*, 16:22-24, Sept., 1971.

[113] J. C. Stanley, "Relative Predictability of Freshman Grade-Point Average from SAT Scores in Negro and White Southern Colleges" (Madison: Laboratory of Experimental Design, 1966, Mimeographed).

[114] S. P. Roberts, *Studies in Identification of College Potential* (Nashville: Fisk University, 1962).

[115] Astin, "Racial Considerations in Admissions," loc. cit.

[116] G. Temp, "Validity of the SAT for Blacks and Whites in Thirteen Integrated Institutions," *Journal of Educational Measurement*, 8:245-257, Winter, 1971.

[117] C. Pfeifer, M. Michael, and W. E. Sedlacek, "The Validity of Academic Predictors for Black and White Students at a Predominantly White University," *Journal of Educational Measurement*, 8 (4):253-261, Winter, 1971; see also A. Kallingal, "The Prediction of Grades for Black and White Students at Michigan State University," *Journal of Educational Measurement*, 8:263-265, Winter, 1971; J. Harris and J. Reitzel, "Negro Freshmen Performance in a Predominantly Non-Negro University," *Journal of College Student Personnel*, 8:366-368, Nov., 1967; see also J. L. Horowitz, W. E. Sedlacek, and G. C. Brooks, Jr., *Correlates of Black and White University Student Grades Beyond the Freshman Year*, Research Report No. 7-72 (University of Maryland: Cultural Study Center, 1972); see also J. C. Stanley, A. B. Biaggio, and A. C. Porter, "Relative Predictability of Freshmen Grade Point Averages from SAT Scores in Negro and White Southern Colleges" (paper read at American Research Association and the National Council on Measurement in Education, Chicago, Feb., 1966).

[118] J. A. Davis and G. Temp, "Is the SAT Biased Against Black Students?" *College Board Review*, 81:4-9, Fall, 1971.

[119] K. B. Clark and L. Plotkin, *The Negro Student at Integrated Colleges* (New York: National Scholarship and Fund for Negro Students, 1963).

[120] H. Borgen, "Differential Expectations? Predicting Grades for Black Students in Five Types of Colleges," Measurement and Evaluation in Guidance, 4:206-212, Jan., 1972.

[121] A. J. Jaffe and W. Adams, "Trends in College Enrollment," College Board Review, No. 55:27ff, Winter, 1964-65, cited by A. J. Jaffe, W. Adams, and S. Meyers, Negro Higher Education in the 60's (New York: Praeger, 1968), p. 74.

[122] J. Egerton, "The White Sea of Higher Education," The Minority Student on the Campus: Expectations and Possibilities, eds., R. A. Altman and P. O. Snyder (Boulder: Western Interstate Commission for Higher Education, 1971), pp. 35-41.

[123] Astin, College Dropouts: A National Profile, loc. cit.

[124] Clark and Plotkin, loc. cit.

[125] Davis, Loeb, and Robinson, loc. cit.

[126] Astin, "Racial Considerations in Admissions," loc. cit.

[127] Bowles and DeCosta, op. cit., p. 185.

[128] Jaffe, Adams, and Myers, op. cit., p. 252.

[129] Ibid.

[130] D. J. Watley, Black and Nonblack Youth: Characteristics and College Attendance Patterns, NMSC Research Reports, Vol. 7, No. 4, (National Merit Scholarship Corporation, 1971).

[131] Harris and Reitzel, loc. cit.; see also Pfeifer, Michael, and Sedlacek, loc. cit.; see also Kallingal, loc. cit.; see also L. Munday, "Predicting College Grades Using ACT Data," Educational and Psychological Measurement, 27:401-406, Summer, 1967; see also W. E. Coffman, "Developing Tests for the Culturally Different," School and Society, 93:430-433, Nov., 1965; see also O. W. Hascall, "Predictability of College Grades: Differences Between Two Apparently Like Colleges" (paper read at Association of Institutional Research, Athens, Georgia, May, 1967).

[132] L. E. Tyler, The Psychology of Human Differences (2nd ed., New York: Appleton Century Crofts, 1956), cited by D. Wechsler, The Measurement and Appraisal of Adult Intelligence (4th ed., Baltimore: Williams and Wilkins, 1958).

[133] Wechsler, Ibid., p. 148.

[134] B. N. Adams and M. T. Meidam, "Economics, Family Structure, and College Attendance," American Journal of Sociology, 74:230-239, Nov., 1968.

[135] K. E. Young, Access to Higher Education (American Association of State Colleges and Universities, April, 1971).

[136] E. Walster, T. A. Cleary, and M. M. Clifford, "Research Note:

The Effect of Race and Sex on College Admission," Sociology of Education, 44:237-244, Spring, 1970.

[137] Ibid.

[138] D. Speigel and P. Keith-Spiegel, "Multiple Predictors of Course Grades for College Men and Women," Journal of College Student Personnel, 12:44-48, Jan., 1971; see also R. P. Lowman and D. W. Spuck, "Variables Related to College Success for the High-Risk Student" (paper read at Western Psychological Association, San Francisco, April, 1971).

[139] Borup, loc. cit.

[140] J. M. Foster and D. D. Jenkins, KSU Freshmen, 1960-1964 Potential Ability (ACT) and Obtained Grades, Studies in Student Personnel Work Research Reports, No. 30 (Kansas State University, Student Counseling Center, Dec., 1965).

[141] J. D. Boyd, "The Relative Prognostic Value of Selected Criteria in Predicting Academic Success at Northwestern University," Dissertation Abstracts, 15:1780, Dec., 1955.

[142] D. W. Irvine, "Estimated Grades and Freshmen Achievement," Vocational Guidance Quarterly, 13:193-195, March, 1965.

[143] Lindsay and Althouse, loc. cit.

[144] W. B. Michael, R. A. Jones, A. Coe, A. Gershon, M. Hoover, K. Katz, and D. Smith, "High School Record and College Board Scores as Predictors of Success in a Liberal Arts Program During the Freshman Year of College," Educational and Psychological Measurement, 22:399-400, Feb., 1962.

[145] J. C. Stanley, "Further Evidence Via the Analysis of Variance that Women are More Predictable Academically than Men," Ontario Journal of Educational Research, 10:49-56, Jan., 1967.

[146] L. Flora, "Predicting Academic Success at Lynchburg College from Multiple Correlation Analyses of Four Selected Predictor Variables," Dissertation Abstracts, 27:2276, 8-A, 1967.

[147] M. Siegelman, "SAT and High School Average Predictions of Four Year College Achievement," Educational and Psychological Measurement, 31:947-950, Winter, 1971.

[148] J. Bowers, "Factor Structures and Predictive Validities of College Ability Tests for Regularly Admitted and Disadvantaged Beginning Freshmen at the University of Illinois" (paper read at American Educational Research Association, Minneapolis, March, 1970).

[149] T. D. F. Langen, "Sex Status and the Prediction of Academic Performance" (unpublished report, University of Washington, 1966), (College Student Personnel Abstracts, 2:280, Spring, 1967).

[150] B. R. Buszek, "Differential Treatment of Test Scores," College and University, 43:294-307, Spring, 1968.

[151] A. M. Cherdack, "The Predictive Validity of the Scholastic Aptitude Test for Disadvantaged College Students Enrolled in a Special Education Program, Final Report" (Office of Education, Washington, D. C., Bureau of Research), (Washington, D. C.: ERIC Clearinghouse on Higher Education, Oct., 1971).

[152] Foster and Jenkins, loc. cit.; see also A. R. Baron, "Non-intellective Variables Related to Successful and Unsuccessful Students in a Junior College" (unpublished report, 1968), (*College Student Personnel Abstracts*, 5:1-2, Fall, 1969); see also D. J. Veldman, "Effects of Sex, Aptitudes, and Attitudes on the Academic Achievement of College Freshmen," *Journal of Educational Measurement*, 5:245-249, Fall, 1968.

[153] Astin, *College Dropouts: A National Profile*, loc. cit.; see also D. W. Irvine, "Graduation and Withdrawal: An Eight Year Follow-up," *College and University*, 41:32-40, Fall, 1965.

[154] A. H. Hill, "A Longitudinal Study of Attrition Among High Aptitude College Students," *Journal of Educational Research*, 60:166-173, Dec., 1966.

[155] R. G. Cope, "Sex Related Factors and Attrition Among College Women," *Journal of the National Association of Women Deans and Counselors*, 33:118-124, Spring, 1970.

[156] Astin, "Recent Findings from the ACE Research Program: Implications for College Choice and Admissions," loc. cit.; see also Astin, *College Dropouts: A National Profile*, loc. cit.; see also H. E. Yuker, P. Lichtenstein, and P. Witheiler, *Who Leaves Hofstra for What Reason*, Research Report No. 102 (Hofstra University: Center for the Study of Higher Education, May, 1972).

[157] L. A. D'Amico, "Changes in Number of Married Students in Indiana Institutions: 1956-57 to 1965-66," *College and University*, 43:178-184, Winter, 1968; see also C. Clarke, *Marriage and College Life*, Marriage and College Life Project (Department of Student Health, University of Florida, May, 1969).

[158] Iffert and Clarke, loc. cit.; see also D. J. Watley, *Black and Non-Black Youth: Does Marriage Hinder College Attendance?* NMSC Research Reports, Vol. 7, No. 5 (National Merit Scholarship Corporation, 1971); see also D. J. Watley, *Career or Marriage?: A Longitudinal Study of Able Young Women*, NMSC Research Reports, Vol. 5, No. 7 (National Merit Scholarship Corporation, 1969); see also H. B. Schleman, "Educational Planning for Wives of Men Students," *Journal of the National Association of Women Deans and Counselors*, 33:23-26, Fall, 1969; see also A. E. Bayer, *The Black College Freshman: Characteristics and Trends*, ACE Research Reports, Vol. 7, No. 3 (American Council on Education, Oct., 1972).

[159] Watley, *Black and Non-Black Youth: Does Marriage Hinder College Attendance?* loc. cit.; see also R. B. Klein and F. A. Snyder, "Non-Academic Characteristics and Academic Achievement," *Journal of College Student Personnel*, 10:328-332, Sept., 1969; see also J. R. Eshleman and C. L. Hunt, "Social Class Influences on Family Adjustment Patterns of Married College

Students" (paper read at American Sociological Association, Miami Beach, Aug., 1966).

[160] Watley, Career or Marriage?: A Longitudinal Study of Able Young Women, loc. cit.; see also Aiken, loc. cit.; see also D. W. Irvine, "University Dropouts in Good Standing," Journal of the Association of College Admissions Counselors, 12 (1):13-17, 1967; see also A. A. Dole, "Iffert Revisited: Persisters and Defaulters," Journal of College Student Personnel, 10:185-192, May, 1969; see also V. Hildebrand, "Academic Orientation of College Students' Wives," Personnel and Guidance Journal, 45: 597-599, Feb., 1967.

[161] Iffert and Clarke, loc. cit.

[162] Watley, Black and Non-Black Youth: Does Marriage Hinder College Attendance? loc. cit.

[163] Bayer, loc. cit.

[164] Schleman, loc. cit.

[165] Watley, Career or Marriage?: A Longitudinal Study of Able Young Women, loc. cit.

[166] Eshleman and Hunt, loc. cit.

[167] Klein and Snyder, loc. cit.

[168] Watley, Black and Non-Black Youth: Does Marriage Hinder College Attendance? loc. cit.

[169] Eshleman and Hunt, loc. cit.; see also Clarke, loc. cit.; see also W. R. Mason, Jr., "Problems of Married College Students: Health Education Implications," Journal of the American College Health Association, 14:270-276, April, 1966.

[170] Eshleman and Hunt, ibid.; see also W. R. Mason, ibid.; see also W. H. Sharp and H. A. Marra, "Factors related to Classification of Client Problems, Number of Counseling Sessions, and Trends of Client Problems," Journal of Counseling Psychology, 18:117-122, March, 1971.

[171] Irvine, "University Dropouts in Good Standing," loc. cit.; see also Hildebrand, loc. cit.

[172] Dole, loc. cit.; see also Watley, Career or Marriage?: A Longitudinal Study of Able Young Women, loc. cit.; see also Aiken, loc. cit.

[173] Crossland, loc. cit.; see also R. Ferrin, "Barrier to Universal Higher Education" (Palo Alto: College Entrance Examination Board), (Washington, D. C.: ERIC Clearinghouse on Higher Education, March, 1970).

[174] Iffert and Clark, loc. cit.

[175] Fox, loc. cit.

[176] G. D. Demos, "Analysis of College Dropouts--Some Manifest and Covert Reasons" (paper read at American Personnel and Guidance Association, Dallas, March, 1967).

[177] D. L. Kester, "California Community Stopouts: A Comparison of Three Nor Cal-CCHE Follow-Up Studies" (U. S. Office of Education, DHEW, Division of Academic Facilities, Dec., 1971), (Washington, D. C.: ERIC Clearinghouse on Junior Colleges, April, 1972).

[178] Yuker, Lichtenstein, and Witheiler, loc. cit.

[179] R. E. Iffert, *Retention and Withdrawal of College Students*, Bulletin 1958, No. 6 (Washington: DHEW, Government Printing Office, 1957), (Washington, D. C.: ERIC Clearinghouse on Higher Education, Feb., 1972).

[180] J. Summerskill, "Dropouts from College," *The American College*, ed. N. Sanford (New York: Wiley, 1962).

[181] Orwig, loc. cit.

[182] L. Gladieux and L. D. Rice, "Report from the Washington Office," *Financial Aid News*, Vol. 2, No. 4 (New York: College Scholarship Service/College Entrance Examination Board, March, 1973), p. 5; see also R. G. Moon, Jr., "Student Aid in a Decade of Decision," *College Student Personnel Work in the Years Ahead*, ed. G. J. Klopf (Washington: American Personnel and Guidance Association, 1966), pp. 60-68.

[183] R. G. Kinney, "The Effect of Scholarship Aid Upon the Academic Achievement and Persistence of Washington State University Undergraduates," *Dissertation Abstracts International*, 31 (8-A):3903-A, Feb., 1971.

[184] Rhodes and Caple, loc. cit.

[185] H. S. Astin, A. W. Astin, A. S. Bisconte, and H. H. Frankel, *Higher Education and the Disadvantaged Student* (Washington: Human Services Press, 1972).

[186] Yuker, Lichtenstein, and Witheiler, loc. cit.

[187] J. F. Carmody, R. H. Fenske, and C. S. Scott, *Changes in Goals, Plans, and Background Characteristics of College-Bound High School Students*, ACT Research Report, No. 52 (Iowa City: American College Testing Program, Aug., 1972); see also Regents' Commission on the Urban University in the 70's, *Report of the Regents' Commission on the Urban University in the 70's* (Omaha: University of Nebraska Board of Regents, Sept. 30, 1970), p. 4.

[188] Baird, loc. cit.; see also E. Carpenter, "A Study of Needs and Activities of Financial Aid Recipients and Non-Recipients," *Journal of Student Financial Aid*, 1:8-17, Nov., 1971; see also G. A. Schlekat, "Financial Aid Decisions and the Socioeconomic Class of Applicants," *Journal of College Student Personnel*, 9:146-149, May, 1968.

[189] "California Student Resource Survey," *Financial Aid News*, Vol. 2, No. 4 (New York: College Scholarship Service/College Entrance

Examination Board, March, 1973), pp. 2-3; see also "How Part-Time Work Affects Academic Performance," Journal of College Placement, 29:104, April-May, 1969.

[190] G. F. Hamerlik and J. E. Brown, "A Comparison of Working and Non-Working Freshmen's First Semester Grade Point Average at the University of North Dakota," College of Education Record of the University of North Dakota, 55:10-11, Oct., 1969.

[191] J. E. Hay and C. A. Lindsay, "The Working Student: How Does He Achieve?" Journal of College Student Personnel, 10:109-114, March, 1969.

[192] J. B. Henry, "Part-Time Employment and Academic Performance of Freshmen," Journal of College Student Personnel, 8:257-260, July, 1967.

[193] Baron, loc. cit.

[194] "How Part-Time Work Affects Academic Performance," loc. cit.

[195] Hay and Lindsay, loc. cit.

[196] J. D. Augsberger, An Analysis of Academic Performance of Working and Non-Working Students on Academic Probation at Northern Illinois University (University of Missouri, 1971).

[197] J. E. Hay, K. Evans, and C. A. Lindsay, "Student Part-Time Jobs: Relevant or Non-Relevant," Vocational Guidance Quarterly, 19:113-118, Dec., 1970.

[198] H. E. Babbush and M. V. Neal, "The College Work-Study Program," Journal of College Placement, 28:103-107, April-May, 1968.

[199] W. B. LeGrand, F. Piercy, and G. Panos, The Effects of Holding a Work-Study Job on the Academic Achievement of First Semester Freshmen at the University of South Carolina, Research Notes No. 9 (Division of Student Affairs, University of South Carolina, May, 1970).

[200] B. B. Kelly, "An Analysis of Various Types of Financial Aid and Academic Achievement at the University of Illinois," Dissertation Abstracts International, 31 (9-A):4550-A, March, 1971.

[201] E. L. Klingelhofer, "Do Race and Economics Decide Who Gets What?" Journal of Student Financial Aid, 1:34-35, May, 1971; see also S. Jacobson, "Financial Aid for College Students," Student Personnel Services for Adults in Higher Education, ed. M. L. Farmer (Metuchen: Scarecrow Press, 1967), pp. 136-148; see also Financial Aid Handbook for Counselors in Nebraska Schools, (2nd ed., Nebraska Association of Student Financial Aid Administrators).

[202] H. E. Kaiser and G. Bergen, "Shall College Freshmen Work?" Journal of College Student Personnel, 9:384-385, Nov., 1968.

[203] Pedrini and Pedrini, "Reading Ability and Grades: A Brief Review," loc. cit.

[204] K. B. Clark, M. Deutsch, A. Gartner, F. Keppel, H. Lewis, T. Pettigrew, L. Plotkin and F. Riessman, The Educationally Deprived (New York: Metropolitan Applied Research Center, 1972); see also "Academically Disadvantaged Minority Group Students in Public Two Year Colleges" (Harrisburg: Pennsylvania State Department of Education, Bureau of Curriculum Development and Education, Oct., 1971), (Washington, D. C.: ERIC Clearinghouse on Junior Colleges, April, 1972).

[205] Crossland, loc. cit.; see also W. E. Sedlacek, J. B. Brooks, Jr. and L. A. Mindus, Black and Other Minority Admissions to Large Universities: Three Year National Trends, Research Report No. 3-72 (University of Maryland, Cultural Study Center, 1972).

[206] W. E. Sedlacek and G. C. Brooks, "Black Freshmen in Large Colleges: A Survey," Personnel and Guidance Journal, 49:307-312, Dec., 1970; see also W. W. Willingham, Admission of Minority Students in Midwestern Colleges (New York: Midwest Committee for Higher Education Survey, College Entrance Examination Board, May, 1970).

[207] F. F. Harcleroad, "Disadvantaged Students: What Makes for College Survival" (paper read at American Association for Higher Education, Chicago, March, 1971).

[208] Ibid.

[209] V. Bahe, "Reading Instruction and College Achievement," Reading Improvement, 6:57-61, 77, Winter, 1969; see also J. W. Brown, M. Watson, and R. Bowden, "Building Basic Skills at the Community Level: A New Approach," Journal of the Reading Specialist, 9:144-150, 158, May, 1970.

[210] W. Thompson, "Experiment in Remedial Reading," School and Society, 34:156-158, Feb., 1931.

[211] G. Regensburg, "Relationship Between Participation in a Reading Improvement Course and Grade Point Averages of College Freshmen," Dissertation Abstracts, 27:1559A, Dec., 1966; see also "The Relationship Between College Reading Laboratory Experience and Gain in College Grade Point Average," Journal of the Reading Specialist, 7:50-54, Dec., 1967.

[212] R. Kilby, "Relation of a Remedial Reading Program to Scholastic Success in College," Journal of Educational Psychology, 36:513-534, Dec., 1945.

[213] S. Ikenberry, "Effects of Reading, Study Skills Improvement, and Reduced Credit Load on Achievement and Persistence of Failure Prone College Freshmen: A Pilot Study" (Office of Education, Washington, D. C., Bureau of Research, Nov., 1966), (Washington, D. C.: ERIC Clearinghouse on Reading, Feb., 1969).

[214] Pedrini and Pedrini, "Reading Ability and Grades: A Brief Review," loc. cit.

[215] F. S. Foreman, "Study of Self-Reinforcement and Study Skills Program with Bright College Underachievers," Dissertation Abstracts, 30:

1430A, Oct., 1969; see also R. L. Dubois, "Improvement of Textbook Comprehension in College Reading Classes," Journal of Reading, 13:113-118, 165-166, Nov., 1969; see also W. C. Hampton, "Multi-Level and Mono-Level Approaches to Study Skills with College Freshmen," Dissertation Abstracts, 30:1361, Oct., 1969.

[216] L. J. Yuthas, "A Study of Two Approaches to the Teaching of Remedial Reading to Low Achievers at an Urban College," Dissertation Abstracts, 30:2272A, Dec., 1969; see also Pedrini and Pedrini, "Read-Ability and Grades: A Brief Review," loc. cit.

[217] J. Egerton, "At San Mateo, Readiness Instead of Remedies," Southern Education Report, 4:20-23, Nov., 1968; see also M. Harshbarger, "A University Reading and Study Skills Program for High-Risk Students" (paper presented at the Annual Meeting of International Reading Association, Detroit, May, 1972); see also B. Somerville, "Can Selective Colleges Accomodate the Disadvantaged? Berkeley Says 'Yes'," College Board Review, 65: 5-10, Fall, 1967; see also R. K. Kelly, "An Experimental Work-Study Program for Disadvantaged Youth," Educational Record, 49:214-220, Spring, 1968; see also F. L. Denmark, E. J. Shirk, and V. U. Hirsch, "Determinants of Success in a College Preparatory Program for Disadvantaged High School Graduates" (paper read at Eastern Psychological Association, Washington, April, 1968); see also C. J. Jensema and C. E. Lunneborg, A Preliminary Investigation of a Special Education Program for Minority Group University Students (University of Washington, Bureau of Testing, June, 1970).

[218] O. R. Hendrix, "The Effect of Special Advising on Achievement of Freshmen With Low Predicted Grades," Personnel and Guidance Journal, 44: 185-188, Oct., 1965; see also D. R. Raymer, "A Study of Compensatory Education for 'High-Risk' College Students," Dissertation Abstracts International, 31 (7-A):3377, Jan., 1971; see also B. Somerville, "Minorities and Higher Education" (paper read at Western College Association, San Diego, March, 1967); see also G. L. Heath, "An Inquiry into a University's 'Noble Savage' Program," Integrated Education, 8:4-9, July-Aug., 1970; see also O. A. Heinkel, "Evaluation of a General Studies Program for the Potentially Low Academic Achiever in California Junior Colleges. Final Report" (Office of Education, Washington, D. C., Bureau of Research, April, 1970), (Washington, D. C.: ERIC Clearinghouse on Junior Colleges, 1970); see also W. F. Brown, N. O. Wehe, V. G. Zunker, and W. L. Haslam, "Effectiveness of Student-to-Student Counseling on the Academic Adjustment of Potential College Dropouts," Journal of Educational Psychology, 62:285-289, Aug., 1971.

[219] J. W. Hall, "The Effects of Supportive Services for Disadvantaged College Students," Dissertation Abstracts International, 32:3686A-3687A, 7-A, Jan., 1972.

[220] R. Bucklin and M. Bucklin, "A Program to Assist Marginal College Freshmen," Journal of the National Association of Women Deans and Counselors, 34:148-150, Summer, 1971; see also L. C. Riess, Project College Bound, A Financial Assistance Program for High School Graduates Attending the 1967 Summer Session (Pasadena City College, 1967); see also F. C. Pearce, A Study of Academic Success for College Readiness Students at the College of San Mateo, Research Report 1968-2 (College of San Mateo, 1968);

see also F. B. Freedman and F. C. Myers, "The College Discovery and Development Program: Disadvantaged Youth Prepare for College," Journal of the National Association of Women Deans and Counselors, 32:90-95, Winter, 1969; see also M. Melnick, "Higher Education for the Disadvantaged: Summary. Abstracts and Reviews of Research in Higher Education, Number 12" (Center for the Study of Higher Education, Hofstra University, April, 1971), (Washington, D. C.: ERIC Clearinghouse on Higher Education, 1971); see also C. Z. Wilson, "Recruitment, Academic Support, Financial Aid and Some Interrelated Considerations" (paper read at American Personnel and Guidance Association, Las Vegas, April, 1969).

[221] Brown, et al., loc. cit.; see also A. M. Lahn, "Changes in Study Habits and Attitudes during a College Preparatory Program for High Risk Students" (paper presented at the American Personnel and Guidance Association National Convention, Atlantic City, 1971).

[222] Heinkel, loc. cit.

[223] A. Churchman, "The Adaptation to College of High Risk and Standard Risk Students as a Function of Social Comparison Opportunities," Dissertation Abstracts International, 32:3420-3421, 6-A, Dec., 1971.

[224] "Academically Disadvantaged Minority Group Students in Public Two Year Colleges," loc. cit.

[225] J. M. Ziegler, "Disadvantaged Youth and the Two-Year College," (unpublished Report, Nassau Community College, 1967), (College Student Personnel Abstracts, 2:522-523, Summer, 1967).

[226] Heath, loc. cit.

[227] E. A. Naughton, "What You See Is What You Get: Black Student/White Campus," The Extended Campus, ed. D. W. Vermilye (San Francisco: Jossey-Bass, 1972), pp. 49-66; see also G. I. Joseph, "Black Students on the Predominantly White Campus," Journal of the National Association of Women Deans and Counselors, 32:63-66, Winter, 1969; see also D. Elkind, "From Ghetto School to College Campus: Some Discontinuities and Continuities," Toledo Law Review, 2 & 3: 607-614, Spring-Summer, 1970; see also D. L. Haettenschwille, "Counseling Black College Students in Special Programs" (Washington, D. C.: ERIC Clearinghouse on Counseling and Personnel Services, 1970).

[228] A. S. Pruitt, "Black Poor at White Colleges--Personal Growth Goals," Journal of College Student Personnel, 11:3-7, Jan., 1970; see also G. D. Morgan, The Ghetto College Student: A Descriptive Essay on College Youth From the Inner City (Iowa City: American College Testing Program, 1970).

[229] D. Bush, "Disadvantaged Students at College: A New Dimension," AHE College and University Bulletin, 19:2-3, March, 1967; see also J. J. Cardoso, "Ghetto Blacks and College Policy," Liberal Education, 55:263-272, Oct., 1969; see also L. Berger, "University Programs for Urban Black and Puerto Rican Youth," Educational Record, 49:382-388, Fall, 1968.

[230] Kendrick, "Minority Students on Campus," loc. cit.; see also

Brandson, loc. cit.; see also R. L. Williams, "What Are We Learning From Current Programs for Disadvantaged Students?" Journal of Higher Education, 40:274-285, April, 1969.

[231] G. W. Morgan, loc. cit.; see also W. D. Monlouis, "Higher Education Opportunities for the High-Risk Disadvantaged Students: A Review of the Literature," Currents '70, 1:14, Feb., 1970.

[232] Harshbarger, loc. cit.,; see also J. Egerton, "High Risk: Five Looks," Southern Education Report, 3:25-36, April, 1968; see also J. Egerton, "High Risk," Southern Education Report, 3:3-14, March, 1968.

[233] Somerville, "Can Selective Colleges Accomodate the Disadvantaged? Berkeley Says 'Yes'," loc. cit.; see also R. K. Kelly, loc. cit.

[234] Harcleroad, loc. cit.

[235] Denmark, Shirk, and Hirsch, loc. cit.

[236] Jensema and Lunneborg, loc. cit.; see also Heinkel, loc. cit.

[237] Heinkel, ibid.

[238] Hendrix, loc. cit.

[239] Raymer, loc. cit.

[240] Somerville, "Minorities in Higher Education," loc. cit.

[241] Hall, loc. cit.

[242] Heath, loc. cit.

[243] Heinkel, loc. cit.

[244] Brown, et al., loc. cit.

[245] R. A. Griesing, "The High-Risk Student," North Central Association Quarterly, 43:328-334, Spring, 1969.

[246] Bucklin and Bucklin, loc. cit.

[247] Riess, loc. cit.

[248] Pearce, loc. cit.

[249] Freedman and Myers, loc. cit.

[250] Melnick, loc. cit.

[251] Churchman, loc. cit.; see also Brown, et al., loc. cit.; see also Lahn, loc. cit.

[252] J. Bowers, "The Comparison of GPA Progression Equations for Regularly Admitted and Disadvantaged Freshmen at the University of

Illinois," Journal of Educational Measurement, 7:219-225, Winter, 1970.

[253] Denmark, Shirk, and Hirsch, loc. cit.; see also J. Bowers, "The Evaluation of a Special Educational Opportunities Program for Disadvantaged College Students. Final Report" (Illinois University, Urbana, Office of Education, DHEW, Washington, D. C.: Bureau of Research), (Washington, D.C.: ERIC Clearinghouse on Higher Education, June, 1971).

[254] S. R. Beasley, "The Use of Biographical Data as a Predictor of Academic Success for Minority Students at the University of Colorado," Dissertation Abstracts International, 32:6753-A, 12-A, June, 1972.

[255] Egerton, "High Risk: Five Looks," loc. cit.

[256] R. L. Beach, Identifying the Potentially Successful Among Marginal College Entrants. Final Report (Office of Education, DHEW, Washington, D. C., Bureau of Research, Aug., 1968).

[257] Jensema and Lunneborg, loc. cit.

[258] Pearce, loc. cit.

[259] L. T. Hammond and D. C. Rosick, "Problems of Prediction With College Education Achievement Project Students at Allen University" (paper presented at the Annual Meeting of American Educational Research Association, New York, Feb., 1971).

[260] P. F. Hodges, "Prediction of College Success for Disadvantaged and Typical College Students," Dissertation Abstracts International, 32: 2985B-2986B, 5B, Nov., 1971.

[261] Cherdack, "The Predictive Validity of the Scholastic Aptitude Test for Disadvantaged College Students Enrolled in a Special Education Program. Final Report," loc. cit.

CHAPTER III

METHODOLOGY

Initially discussed is the student population from which various samples and subsamples were drawn. The materials employed are then explained. The experimental design and methodologies to resolve the hypotheses of this study are then detailed and discussed in the following order: analyses of variance, chi squares, product moment correlations, multiple predictions. For each statistical technique, the factors or variables and the sets or subsets of subjects are described and enumerated.

PROCEDURE

Subjects and Groups

The population for this study included the new, first semester, full-time, UNO freshmen for the 1972-73 academic year. Delineated were two research samples, experimental and control, selected from the freshman population.

The experimental group consisted entirely of Goodrich freshmen. There was a total of ninety-four persons enrolled in the Goodrich Plan in the fall of 1972. Of these ninety-four students only seventy-five met the following criteria for inclusion in the experimental group: 1) new, first semester (fall), 1972, full-time, UNO freshman, 2) enrolled in the Goodrich Plan, 3) Black or White, and 4) had taken the ACT. The seventy-five experimental subjects were categorized for race and sex yielding: sixteen Black men, nineteen Black women, eighteen White men, and twenty-two White women. Four of the experimental subjects had Spanish surnames. Of the nineteen Goodrich students excluded from the experimental group, sixteen had not taken the ACT and three had taken it. Of the three students who had taken the ACT, two were listed by the registrar as part-time students, and one did not have registration data available.

The control group was a stratified (for race[1] and sex) random sample of new, first semester, 1972, full-time, UNO freshmen previously identified as having taken the ACT, equated in number with the Goodrich sample (that is, the experimental group). Thus, the experimental and control groups each had seventy-five students: sixteen Black men, nineteen Black women, eighteen White men, and twenty-two White women.

Although the control group was representative of the experimental group in terms of race and sex, it was not representative of the ACT freshman population. The experimental group and the control group were 47 percent Black and 53 percent White, 45 percent men and 55 percent women. Comparable figures for the ACT freshman population (including the experimental and control students) were 11 percent Black and 89 percent White, 57 percent men and 43 percent women. Interestingly, most subjects in the ACT freshman population responded to the denotation of sex on registration forms, but only about three fifths responded to the denotation of race.

Various sets and subsets of subjects were identified within the ACT freshman population, the experimental and control sample, the experimental group, and the control group. In addition to race and sex, the following sets (or subsets) were identified: financial aid (recipient, nonrecipient), general achievement/aptitude (subjects with ACT Composite scores below one standard deviation, subjects with ACT Composite scores within or above one standard deviation), grades (subjects with GPA's below 2.0 on a 4.0 scale, subjects with GPA's equal to or above 2.0 on a

4.0 scale), and attrition/persistence (dropout, persister).

The experimental group, only, was considered as to employment during the fall and spring semesters of the 1972-73 school year. This kind of information was not available for the controls. Furthermore, information provided by Goodrich student records subgrouped hours of work per week: 0, 1-10, 11-20, 21-30, 31+.

Materials

The basic materials used in this study were the American College Test (ACT) and the cumulative freshman grade point average (GPA). The ACT was a four part test battery consisting of: English usage, mathematics usage, social studies reading, and natural sciences reading. The English usage subtest provided a measure of the student's "understanding and use of the basic elements in correct and effective writing: punctuation, capitalization, usage, phraseology, style, and organization."[2] The mathematics usage subtest measured the student's "mathematical reasoning ability. This test emphasized the solution of practical quantitative problems which are encountered in many college curricula. It also included . . . mathematical techniques covered in high school courses."[3] The social studies reading subtest yielded a score which measured the student's "evaluative reasoning and problem-solving skills required in the social studies. It measured comprehension of . . . typical social studies material . . .understanding of basic concepts, knowledge of sources of information, and knowledge of special study skills needed in college work in the social studies."[4] The last subtest, natural sciences reading, measured the student's "critical reasoning and problem-solving skills required in the natural sciences. Emphasis was placed on the formulation and testing of hypotheses and the evaluation of reports of scientific experiments."[5]

The raw scores obtained on each of the four subtests were converted to standard scores.[6] The average or mean of the four standard scores (corresponding to the four subtests) was the ACT Composite standard score which ranged from 1--35[7] and had a mean of 19.2[8] and a standard deviation of 5.4[9], based on college bound high school seniors. The Composite score had a greater reliability and a smaller median standard error than any of the subtests taken individually,[10] and was used in this study. The predictive validity of the Composite score for the overall GPA in the ACT standardization population was .50.[11]

This study also used the cumulative freshman grade point average (GPA) for each student as a measure of academic success in college. Specifically the cumulative GPA for the fall and spring semesters of the 1972-1973 school year was computed for each subject considered in this study.

DATA ANALYSIS

Descriptive Data

Descriptive data were computed to compare the general achievement/aptitude, academic performance, and attrition/persistence of the experimental and control groups, and the subgroups within and between these groups. Specifically, the means and standard deviations of ACT scores, cumulative GPA's, and attrition/persistence scores were determined for the total sample, for the experimental group, and for the control group. Means and standard deviations were also computed for subsets within the sample, within the experimental group, and within the control group. Subsets categorized subjects as financial aid recipients, nonfinancial aid recipients; persons with below average ACT scores, persons with average or above average ACT scores; Blacks, Whites; men, women; Black men, Black women, White men, White women; persons with below average grades, persons with average or above average grades; dropouts, persisters.

When comparing experimental and control subjects, GPA's were also considered for the kinds of courses taken by students. That is, experimental students took regular courses and special Goodrich courses. Consequently, the grades of experimental students were considered in three ways: total GPA (which combined regular and Goodrich course grades); experimental GPA (which considered only Goodrich course grades); regular GPA (which considered only regular course grades). Some experimental students took Goodrich courses for noncredit. Consequently, these students only had grades in regular courses.

The descriptive data involving ACT scores, cumulative GPA's, and attrition/persistence scores are presented in Appendices E, F, and H, respectively. Appendix G presents the cumulative GPA descriptive data which considered the types of courses taken by students.

Analyses of Variance

Analyses of variance were computed to test for significant mean differences among several factors for 1) general achievement/aptitude test scores, 2) grades, and 3) attrition/persistence. Each of the analyses performed used a four[12] (2x2x2x2) or five (2x2x2x2x2) factor unweighted means solution.[13]

Each factor had two levels and was identified by a letter as follows: factor U, group (experimental, Goodrich; control); factor I, instruction--financial aid received (special, regular); factor C, control group--financial aid (assistance received, assistance not received); factor P, programs (special instruction and financial aid received; regular instruction and no financial aid received); factor R, race (Black; White); factor S, sex (male, female); factor T, general achievement/aptitude (below average; average and above average); factor G, grades (below average; average and above average); and factor A, attrition (dropout; persister).

The factor of group (U) was intended to contrast the experimental (Goodrich) students and the control students. There were seventy-five students in the experimental group and seventy-five students in the control group. The control students were chosen at random from the stratified race and sex nonGoodrich ACT freshmen population.

The factor of instruction--financial aid received (I) was intended to consider special (Goodrich) instruction versus regular instruction. Of the students who received special instruction (that is, experimental subjects), all received financial aid. Of the students who received regular instruction (that is, control subjects), some received financial aid and some did not receive financial aid. This meant that there were three types of students: special instruction financial aid recipients, regular instruction financial aid recipients, and regular instruction nonfinancial aid recipients. In order to contrast regular instruction and special instruction a comparable group of students had to be isolated. Thus, nonfinancial aid recipients were eliminated. Consequently, there was a total of one hundred subjects studied for factor I: seventy-five special instruction financial aid recipients (experimental subjects) and twenty-five regular instruction financial aid recipients (control subjects). Thus, this factor (I) considered instruction as related to financial aid recipients.

Analogously, the factor of control group--financial aid (C) was intended to consider receiving financial aid versus not receiving financial aid. Of the students who did not receive financial aid, all were control subjects (who received regular instruction). Of the students who received financial aid, some were control subjects (who received regular instruction), some were experimental subjects (who received special instruction). Thus, there were three types of students: control nonfinancial aid recipients (who received regular instruction), control financial aid recipients (who received regular instruction), and experimental financial aid recipients (who received special instruction). In order to contrast receiving financial aid and not receiving financial aid, a comparable group of students had to be isolated. Thus, experimental (special instruction) students were eliminated. Consequently, there was a total of seventy-five control subjects studied for factor C: twenty-five financial aid recipients who received regular instruction and fifty nonfinancial aid recipients who received regular instruction. Thus, this factor (C) considered financial aid as related to control students (all of whom received regular instruction).

The factor of programs (P) was intended to contrast receiving and not receiving both special instruction and financial aid. All students who received both special instruction and financial aid were experimental subjects. All students who received neither special instruction nor financial aid were control subjects. (The control subjects who received financial aid were eliminated.) Consequently, there was a total of 125 subjects studied for factor P: 75 experimental subjects who received special instruction and 50 control subjects who received neither special instruction nor financial aid. Thus, this factor (P) considered special instruction and financial aid as related to program participants.

The factor of race (R) was intended to contrast Blacks and Whites. There were seventy Blacks (thirty-five experimental subjects and thirty-five control subjects) and eighty Whites (forty experimental subjects and forty control subjects).

The factor of sex (S) was intended to contrast males and females. There were sixty-eight men (thirty-four experimental subjects and thirty-four control subjects) and eighty-two women (forty-one experimental subjects and forty-one control subjects).

The factor of general achievement/aptitude (T) considered student ACT Composite scores. Two levels were delineated. ACT Composite standard scores of less than fourteen fell below one standard deviation[14] (based on college bound seniors) and were considered as below average; ACT Composite scores equal to or greater than fourteen fell within or above one standard deviation and were considered as average/above average. Students with below average ACT scores were contrasted with students with average or above average ACT scores. There were sixty-two subjects with below average ACT scores (twenty-nine experimental and thirty-three control) and eighty-eight subjects with average or above average ACT scores (forty-six experimental and forty-two control).

The factor of grades (G) considered student cumulative GPA's. Two levels were delineated. Cumulative GPA's less than 2.0 (based on a 4.0 system) were approximately equivalent to grades of C- to F and were considered as below average; cumulative GPA's equal to or greater than 2.0 (based on a 4.0 system) were approximately equivalent to grades of C to A and were considered as average/above average. Students with below average grades were contrasted with students with average or above average grades. There were fifty-one subjects with below average grades (twenty experimental and thirty-one control) and ninety-two subjects with average or above average grades (fifty-three experimental and thirty-nine control).

The factor of attrition (A) was intended to contrast dropout and persister. There were forty-nine dropouts (nineteen experimental subjects and thirty control subjects) and one hundred and one persisters (fifty-six experimental subjects and forty-five control subjects).

For analyses which considered mean differences among several factors for 1) general achievement/aptitude (Ta), the scores inserted in the arrays were actual student ACT Composite standard scores; 2) college grades (G), the scores inserted in the arrays were a one or a two indicating that a students's GPA was below average or average/above average, respectively; 3) college attrition/persistence (A), the scores inserted in the arrays were a one or a two indicating that a student was a dropout or a persister, respectively. Students' actual GPA's could not be inserted in the arrays as the distribution of the GPA's did not meet the assumptions of the analysis of variance, that is, the departure from normality and symmetry was extreme.[15]

Students who did not complete any semester did not receive grades. There were two students in the experimental group and five students in the control group who did not receive any grades. These students' scores had to be excluded from analyses which considered grades as a factor or inserts.

Educational Support Program (ESP vs. nonESP) was not considered as a factor in any analysis because of limited sample size. There were only twenty-seven subjects who took some ESP course during the year--ten experimental subjects and seventeen control subjects.

The number of students who requested financial aid and the number who received financial aid was not very different. Twenty-five of the twenty-eight control subjects who requested financial aid received it; all experimental subjects requested and received financial aid. Consequently, financial aid was only considered for receipt and not for request, that is, receiving or not receiving financial aid was all that was considered in any analysis.

Any blank cells which occurred in an array were filled using the formula presented by Winer to estimate missing data.[16] Confounded factors (U, I, C, P) were not used in the same analysis of variance.

A total of eighteen analyses of variance were computed. Firstly, seven analyses considered the relationships among several factors and general achievement/aptitude. Table 4.1 gives a synopsis of the analyses (see p. 88). Secondly, four analyses were concerned with the relationships among grades and various factors. The analyses are summarized in Table 4.4 (see p. 106). Thirdly, seven analyses concentrated on the relationships among several factors and attrition/persistence. Table 4.8 provides an overview of the analyses (see p. 134).

For any of the analyses of variance, if there were significant main effects, the interpretations were straight forward (since each factor had only two levels). But if there were significant interactions, further tests of simple effects were required and computed.[17]

The F ratios obtained from the tests of simple effects were first considered for clustering. If no clustering was apparent, the simple effects were considered for their robustness. The procedure used to determine critical values for the simple effects at the .05 level (the same level used for the overall F ratio) was to divide alpha (.05) by the number of possible subsets in the interaction.[18] Each factor had two levels. Thus, the number of subsets in a two, three, or four factor interaction were four, eighteen, and sixty-four, respectively. The corresponding critical values for simple effects in a two, three, or four factor interaction were .01, .003, and .001, respectively. These computed values were used to determine significant subset simple effects, which were then interpreted.

Chi Square Analyses

Chi square analyses were computed using large samples to determine if significant relationships existed between general achievement/aptitude, or grades, or attrition/persistence, and other variables. Each of the chi squares used a 2 x 2, fourfold contingency table.

The same variables (factors) used for analyses of variance (U, I, C, P, R, S, T, G, A) were used as variables for chi square. Thus, each variable had two levels and was identified with the same letter as used previously: U, group (experimental, nonexperimental); I, instruction--financial aid received (special, regular); C, nonexperimental group--financial aid (assistance received, assistance not received); P, programs (special instruction and financial aid received, regular instruction and no financial aid received); R, race (Blacks, Whites); S, sex (males, females); T, general achievement/aptitude (below average, average or above average); G, grades (below average, average or above average); and A, attrition (dropout, persister). There was one additional variable, F, financial aid (assistance recieved, assistance not received). F differed from I and C in that neither instruction nor group were regarded.

The UNO ACT freshman population was considered for the chi square analyses. The following subsets were also considered: experimental (Goodrich) freshmen, nonexperimental freshmen, nonexperimental freshmen who received financial aid, and nonexperimental freshmen who received no financial aid.

The number of subjects in the various chi squares varied for several reasons. When G (grades) was a variable only the subjects who completed at least one semester, and thereby received grades, were included. When R (race) was a variable only the subjects who completed the race denotation on registration forms were included.

A total of fifty-six chi square analyses were computed. Of the fifty-six performed, twenty-one, sixteen, and nineteen pertained to general achievement/aptitude, to grades, and to attrition/persistence, respectively.

Firstly, chi squares were computed with general achievement/aptitude

(T) as the dependent variable. The following variables, taken individually, were considered in relation to T: U, I, C, P, F, R, S, G, and A. Table 4.2 gives a synopsis of the analyses (see p. 92). Secondly, chi squares with grades (G) as the dependent variable were computed. The following variables were studied independently with G: U, I, C, P, F, R, S, and T. The analyses are summarized in Table 4.5 (see p. 111). Thirdly, chi squares were computed with attrition/persistence (A) as the dependent variable. The following variables, taken individually, were studied in relation to A: U, I, C, P, F, G, R, S, and T. Table 4.9 provides an overview of the analyses (see p. 137).

Product Moment Correlations

Product moment correlations were computed to determine the degree of relationship or association between several independent variables and general achievement/aptitude, grades, or attrition/persistence, as dependent variables. The following were considered (as independent and/or dependent) variables: group (U), financial aid (F), general achievement/aptitude (Ta), race (R), sex (S), employment (E), grades (G), and attrition (A).

The levels of each variable and the values assigned to each level follow. Ta (general achievement/aptitude) was a continuous variable representing actual ACT Composite scores. E (employment) was considered a coarsely grouped, continuous variable representing five categories of hours of employment: 1 (0), 2 (1-10), 3 (11-20), 4 (21-30), 5 (31+). The following variables were true dichotomous variables: U, group, 1(experimental), 2(control); F, financial aid, 1(received), 2(not received); R, race, 1(Black), 2 (White); and S, sex, 1(male), 2(female). The following variables represented continuous data which were artifically dichotomized: G, grades, 1(below average), 2(average or above average), and A, attrition, 1(dropout), 2(persister).

Various product moment correlations were computed depending upon the characteristics of the data. (See Appendix A.) The Pearson product moment correlation coefficient only applied when both variables represented continuous data. Consequently, other product moment correlations were used when dichotomized variables were involved. Point biserial correlations were computed when one variable represented continuous data and the other variable represented true dichotomous data. Biserial correlations were computed when one variable represented continuous data and the other variable represented artificially dichotomous data. Phi coefficients were computed when both variables represented dichotomous data.

Product moment correlations obtained under conditions of coarse grouping were appropriately corrected as recommended by Peters and VanVoorhis,[19] by Guilford and Perry,[20] or by Michael, Perry, and Guilford.[21] Refer to Appendix A for the corrections made in this study. For example, phi coefficients obtained when one or both of the dichotomized variables actually represented continuous data were corrected to estimates of a point biserial or Pearson correlation, respectively.

Correlations were computed for the total sample (all experimental and control subjects), for the experimental group, and for the control group. Correlations were also computed for subsets with the sample, within the experimental group, and within the control group. Subsets categorized students as financial aid recipients, nonfinancial aid recipients; persons with below average ACT scores, persons with average or above average ACT scores; Blacks, Whites; men, women; Black men, Black women, White men, White women.

Firstly, general achievement/aptitude (Ta) as the dependent variable was correlated separately with each of the following independent variables: U, F, R, S, E, G, and A. The correlation data are summarized in Table 4.3 (see p. 97). Secondly, grades (G) as the dependent variable were correlated separately with each of the following independent variables: U, F, Ta, R, S, and E. Only the subjects who received grades were included. Table 4.6 gives a synopsis of the correlation data (see p. 115). Thirdly, attrition/persistence (A) as the dependent variable was correlated separately with each of the following independent variables: U, F, Ta, R, S, E, and G. Table 4.10 provides an overview of the correlation data (see p. 141).

Multiple Predictions

Multiple correlations, standard errors, and regression equations were computed for the prediction of grades and for the prediction of attrition/persistence. The same independent variables used for the correlations were used as multiple predictor variables--group (U), financial aid (F), general achievement/aptitude (Ta), race (R), sex (S), employment (E), and grades (G). Confounded variables (U and F) were not in the same regression equations.

Multiple predictors were determined for the same subjects and subsets of subjects considered for the product moment correlations. That is, R's, standard errors, and regression equations were computed for the total sample (all experimental and control subjects), for the experimental group, and for the control group. The following subsets within the sample, within the experimental group, and within the control group were also studied--financial aid recipients, nonfinancial aid recipients, persons with below average ACT scores, persons with average or above average ACT scores, Blacks, Whites, men, women, Black men, Black women, White men, White women.

The potential predictors varied for the different subsets studied. The subsets which related to financial aid, general achievement/aptitude, race, sex, or race and sex, excluded F, Ta, R, S, or R and S as predictor variables, respectively. Multiple correlations developed for the experimental group, control group, or subsets within either of these groups excluded U as a predictor variable. Thus, for example, the multiple predictors computed for experimental White men would have excluded variables U, R, and S.

Multiple regression involved the determination of optimal weights for variables so as to maximize the prediction of the criterion, for example, grades or attrition/persistence. In this study, a stepwise technique was used to compute the multiple R's. That is, the most influential variables were successively added, one at a time, to the correlation and the regression equation. Multiple R's and their standard errors were corrected because of the relatively large number of predictor variables employed with small samples.[22]

The prediction of grades considered the following independent (multiple) variables: U or F, Ta, R, S, and E. Only subjects who received grades were involved in these multiple R's (maximum n = 143). See Table 4.7 (p. 124).

The prediction of attrition/persistence was considered in two ways. First, grades (G) were not included as a predictor variable. U or F, Ta, R, S, and E were considered as independent (multiple) variables. Subjects were not limited to those who had received grades (maximum n=150). Second, grades (G) were included as a predictor variable along with U or F, Ta, R, S, and E. Only those subjects who received grades were involved in these multiple R's (maximum n=143). See Table 4.11 (p.147) and Table 4.12 (p.152).

The efficiency of the significant multiple predictions for persons in the larger samples (namely, for all persons, and for financial aid recipients) was determined. That is, predicted scores were computed from the regression equations for the persons in question. The predicted scores were then compared with actual scores. Percentages were noted for grades. How many persons were accurately predicted: overall, for below average grades, and for average/above average grades? Percentages were noted for attrition/persistence. How many persons were accurately predicted: overall, for dropouts, and for persisters? These questions were answered.

NOTES AND REFERENCES

[1] Race and sex data were gathered from registration data. NonGoodrich students were not required to respond to the race denotation on the registration forms. Thus, those who did respond, did so voluntarily. Of the 653 NonGoodrich subjects (out of 1,139) who responded to the denotation of race, about 6.4 percent were Black. This was in keeping with the estimated 6.9 percent of Black freshmen at UNO, as determined by a Black Studies Department survey (reported in the Regents Commission Report Revisited, University of Nebraska at Omaha, 1973, p. 12). Therefore, the NonGoodrich ACT freshman percentage that responded to the denotation of race was representative of the UNO freshman class of 1972-73.

[2] American College Testing Program, Technical Report (Iowa City: American College Testing Program, 1965), p. 2.

[3] Ibid.

[4] Ibid., p. 3.

[5] Ibid.

[6] Ibid., p. 12.

[7] American College Testing Program, Using the ACT on Campus (Iowa City: American College Testing Program, 1972), p. 3.

[8] Ibid., p. 2.

[9] Ibid.

[10] American College Testing Program, Technical Report, op. cit., p. 17.

[11] Ibid., p. 18.

[12] Four factor (2x2x2x2) unweighted means, analysis of variance, solutions had to be used (rather than five factor analyses) in some instances to avoid an excessive number of blank cells in the arrays.

[13] B. J. Winer, Statistical Principles in Experimental Design (2d ed.; New York: McGraw Hill, 1971), pp. 445-449; see also C. M. Dayton, The Design of Educational Experiments (New York: McGraw Hill, 1970), pp. 114-123.

[14] American College Testing Program, Using the ACT on Campus, op. cit., p. 2.

[15] See "The Norton Study of the Effects of Non-normality and Heterogeneity of Variance" discussed in E.F. Lindquist, Design and Analysis of Experiments in Psychology and Education (Boston: Houghton Mifflin, 1953), pp. 78-86.

[16] Winer, op. cit., pp. 487-490.

[17] Ibid., pp. 347-351.

[18] R. E. Kirk, Experimental Design: Procedures for the Behavioral Sciences (Belmont: Brooks/Cole, 1968), p. 181.

[19] C. C. Peters and W. R. VanVoorhis, Statistical Procedures and their Mathematical Bases (New York: McGraw Hill, 1940), p. 398.

[20] J. P. Guilford and N. C. Perry, "Estimation of Other Coefficients of Correlation from the Phi Coefficient," Psychometrika, 16:335-346, Sept., 1951.

[21] W. B. Michael, N. C. Perry, and J. P. Guilford, "The Estimation of a Point Biserial Coefficient of Correlation from a Phi Coefficient," British Journal of Psychology, Statistical Section, 5:139-150, Nov., 1952.

[22] J. P. Guilford and B. Fruchter, Fundamental Statistics in Psychology and Education (5th ed.; New York: McGraw Hill, 1973), pp. 366-367.

CHAPTER IV

RESULTS AND DISCUSSION

This chapter is divided into three sections: assessment and prediction of general achievement/aptitude, of grades, and of attrition/persistence. The general achievement/aptitude section focuses on 1) determining whether significant differences existed between ACT means and variances of groups and subgroups (using analyses of variance), 2) determining whether significant differences existed between the expected and obtained numbers of students receiving below average ACT scores and students receiving average/above average ACT scores (using chi squares), 3) determining the degree of association between ACT scores and other individual variables (using product moment correlations).

The sections on the assessment and prediction of grades and of attrition/persistence follow the same format as above. Grades are delineated into below average and average/above average. Attrition/persistence is delineated into dropout and persister. In addition, these sections include, 4) the prediction of grades (or attrition/persistence) from several variables (using multiple predictors and expectancy formulas).

GENERAL ACHIEVEMENT/APTITUDE

The ACT descriptive data presented in Appendix E revealed that the experimental and control groups were similar in their ability to do college work, as each group manifested similar ACT characteristics. That is, for the total sample, the experimental group, and the control group: 1) Blacks had lower mean ACT scores than Whites; 2) Blacks had ACT scores which were restricted in range; 3) persons with lower grades had lower mean ACT scores than persons with higher grades; and 4) the ACT scores of financial aid recipients and nonrecipients, of men and women, and of dropouts and persisters were not very different.

ACT: Analyses of Variance

In this study, control group subjects, equated in number with the experimental group, were randomly chosen from a population stratified for race and sex. This procedure was used to prevent selection biases and to insure comparability. Analyses of variance I-VII (summarized in Table 4.1) were directed at determining whether the groups and subgroups of college students were different in terms of general achievement/aptitude. The ACT Composite scores were the inserts, the criterion in terms of these analyses. Many of the factors among analyses were the same. (See the DATA ANALYSIS section of the previous chapter for further elaboration.)

Factor R, race, eventuated in seven of seven analyses either as a significant main effect and/or in a significant interaction. Grades, factor G, occurred in four of four analyses as a significant main effect and/or in a significant interaction. Factor S, sex, appeared in significant interaction in two of seven analyses. Factor I, instruction--financial aid received, occurred in a significant interaction in one of two analyses and factor C, control group--financial aid, was noted in a significant interaction in one of two analyses. In an individual analysis of variance, when considering the same factors and subsets, interactions took precedence over main effects, and higher order interactions took precedence over lower order interactions.

These results indicated that the ACT Composite scores of Blacks and Whites were significantly different in favor of Whites. That is, Blacks (taken together) had lower ACT scores than Whites. These results were in keeping with the research literature and were not unexpected.

Table 4.1

ACT: Analyses of Variance

Analysis:	I	II	III	IV	V	VI	VII
Number of Factors:	5	4	4	4	4	4	4
Factors:	U R S A G	I R S A	I R S G	C R S A	C R S G	P R S A	P R S G
Criterion:	Ta	Ta	Ta	Ta	Ta	Ta	Ta
Significant Main Effects:	R** G**	R**	R**	R**	R**	R**	R** G**
Significant Interaction Effects:	RC*		IRSG*		CRSG*		RG**
Total N[1]:	143	100	96	75	70	125	120
experimental n:	73	75	73	0	0	75	73
control n:	70	25	23	75	70	50	47

*p<.05; **p<.01.

Factors

G=Group: Experimental (Goodrich); Control
I=Instruction, financial aid received: Special instruction (Goodrich); Regular instruction
C=Control group, financial aid: Assistance received; Assistance not received
P=Programs: Special instruction and financial aid received (Goodrich); Regular instruction and no financial aid received
R=Race: Black; White
S=Sex: Male; Female
A=Attrition: Dropout; Persister
G=Grades: Below avg.; Avg. and above avg.

Criterion

Ta=Gen. Ach./Apt. (test): Actual ACT Composite scores

[1] N's varied not only because different subgroups were considered, but because subjects who did not receive any grades had to be eliminated from analyses which included factor G, grades.

Data presented by Hall,[1] Green,[2] Crossland,[3] Bowles and DeCosta,[4] and Davis, Loeb, and Robison[5] revealed similar racial differences in terms of ACT general achievement/aptitude.

Grades (G) were also effective in distinguishing ACT scores. The results indicated that there were significant differences between the mean ACT scores of students receiving average or above average grades (2.0 or higher, on a 4.0 scale) and students receiving below average grades (lower than 2.0, on a 4.0 scale). That is, persons with higher grades tended to have higher ACT scores than persons with lower grades, and vice versa. Typically, in research, college grades have not been alluded to as differentiators of ACT general achievement/aptitude. The reverse usually has been the case, as seen in Cole,[6] Loeb and Mueller,[7] and Spencer and Stallings.[8] However, these results, namely, that ACT scores were differentiated by grades, give additional support to the use of ACT scores as predictors of grades.

In both significant RG interactions (Analyses I and VII) the following simple effects reached criteria: R at G_1 (Analysis I, $F=9.602$, 1/111 df, $p<.01$; Analysis VII, $F=13.894$, 1/104 df, $p<.01$); R at G_2 (Analysis I, $F=41.776$, 1/111 df, $p<.01$; Analysis VII, $F=58.857$, 1/104 df, $p<.01$); G at R_2 (Analysis I, $F=15.204$, 1/111 df, $p<.01$; Analysis VII, $F=17.297$, 1/104 df, $p<.01$). For a discussion of simple effects and criteria see the Data Analysis section, as well as Winer[9] and Kirk.[10] Thus, Blacks with below average grades tended to have significantly lower ACT scores than Whites with below average grades; Blacks with average or above average grades tended to have significantly lower ACT scores than Whites with average or above average grades; and Whites with below average grades tended to have significantly lower ACT scores than Whites with average or above average grades. These statements (et passim) could be stated conversely. For example, the last statement could be stated that Whites with average or above grades tended to have significantly higher ACT scores than Whites with below average grades.

Race (R), sex (S), and SG (sex, grades) as simple effects reached criteria in the IRSG and CRSG interactions (Analyses III and V, respectively): R at $I_2S_1G_1$ and at $C_1S_1G_1$ ($F=18.264$, 1/80 df, $p<.001$ and $F=13.974$, 1/54 df, $p<.001$, respectively), S at $I_2R_2G_1$ and at $C_1R_2G_1$ ($F=18.264$, 1/80 df, $p<.001$ and $F=13.974$, 1/54 df, $p<.001$, respectively), and SG at I_2R_2 ($F=13.564$, 1/80 df, $p<.001$). SG at I_2R_2 required further (pairwise) comparisons, but none of the pairs reached the criterion mentioned by Kirk[11] and discussed in the Data Analysis section. Thus, Black, male, regular instruction, financial aid recipients with below average grades and Black, male, control, financial aid recipients with below average grades tended to have significantly lower ACT scores than their White counterparts. Both of these interpretations refer to the same college students, placed in different factors (I_2 or C_1). Male, White, regular instruction, financial aid recipients with below average grades and male, White, control, financial aid recipients with below average grades tended to have significantly higher ACT scores than their female counterparts. Again, the factors were different (I_2 or C_1) but the referents were the same college students. The ACT sex differentiation (favoring White males) was noted in the literature by Borup.[12]

Factor A, attrition/persistence, did not contribute to any significant main or interaction effect. Thus, dropouts and persisters did not have significantly different levels of general achievement/aptitude as codified in Table 4.1. Also, factors U (group) and P (programs) did not contribute to any significant main or interaction effect. That is, the experimental (Goodrich) and control groups were not differentiated in terms of general ability as measured by the ACT, and neither were the subgroups: special instruction--financial aid received (Goodrich) and regular instruction--financial aid not received.

In summary, the following null hypothesis was negated, namely, that there were no significant differences between the ACT Composite scores of the experimental group and the control group or the subsets within and between these groups. Blacks had significantly lower ACT scores than Whites. Even when subjects with comparable grades were contrasted, Blacks had lower ACT scores than Whites. In addition, race differentiated ACT scores of poor, male, control (regular instruction) students who received below average grades--Blacks had lower scores than Whites. Analogously, sex differentiated ACT scores of poor, White, control (regular instruction) students who received below average grades--women had lower scores than men. Generally, college students with below average grades tended to have lower ACT scores than college students with average or above average grades, and vice versa, but this pertained more to Whites than to Blacks. Dropouts and persisters tended to have similar initial ACT scores. Finally, there were no ACT biases between the experimental group and the control group.

ACT: Chi Squares

Chi squares (in this study, 2 by 2, that is, fourfold contingency tables) were used to indicate whether or not significant differences existed with regard to frequency data. One way of interpreting chi square was to consider the proportional differences between columns and rows. If the proportional differences between columns and rows were marked significance resulted. Of course, sample size was very important.

Table 4.2 denotes chi square relationships according to variables for subjects. The rows indicate the variables considered; the columns indicate the subjects (and subsets of subjects) considered. The chi squares

Table 4.2

ACT: Chi Squares

UNO ACT Freshman Population			Experimental Freshmen			Nonexperimental Freshmen			Nonexperimental Financial Aid Freshmen			Nonexperimental Nonfinancial Aid Freshmen		
	N	p		n	p		n	p		n	p		n	p
U x T	1,214	<.01												
I x T	247	<.01												
C x T	1,139	<.01												
P x T	1,042	<.01												
F x T	1,214	<.01												
R x T	728	<.01	R x T	75	<.01	R x T	653	<.01						
S x T	1,214	ns	S x T	75	ns	S x T	1,139	ns						
G x T	1,156	<.01	G x T	73	<.01	G x T	1,083	<.01	G x T	166	<.01	G x T	917	<.01
A x T	1,214	<.01	A x T	75	ns	A x T	1,139	<.01	A x T	172	<.01	A x T	967	<.01

Variables

U = Group: Experimental, Nonexperimental (control)
I = Instruction of Financial aid recipients: Special (Goodrich), Regular
C = Nonexperimental Group, Financial Aid: Assistance received, Assistance not received
P = Programs, Freshmen: Special instruction and financial aid received (Goodrich); Regular instruction and no financial aid received
F = Financial Aid: Assistance received, Assistance not received

R = Race: Blacks, Whites
S = Sex: Men, Women
G = Grades: Below average, Average or above average
A = Attrition: Dropouts, Persisters
T = Gen.Ach./Apt.: Below average, Average or above average

in this study were based on the UNO ACT freshman population (maximum number of students = 1,214) and the following subsets (with fewer students): experimental freshmen, nonexperimental freshmen, nonexperimental financial aid freshmen, nonexperimental nonfinancial aid freshmen. For example, the U x T chi square (Top row of Table 4.2) corresponds to the relationship between group and general achievement/aptitude for the UNO ACT freshman population.

In Table 4.2, the significances for columns or rows are not necessarily mutually exclusive. The chi squares concerning ACT general achievement/aptitude revealed several significant trends. Reading down in Table 4.2: group (experimental, nonexperimental), instruction--financial aid recipients (special, regular), nonexperimental group--financial aid (assistance received, assistance not received), programs (special instruction and financial aid received, regular instruction and no financial aid received), and financial aid (received, not received), separately produced significant results in the only chi squares in which they occurred. Race (Black, White) produced significant results in three of three chi squares; grades (below average, average and above average) produced significant results in five of five chi squares; and attrition/persistence (dropout, persister) produced significant results in four of five chi squares. The focus was upon ACT scores as the dependent variable. The significances were determined by two-tailed tests.

Analysis of the U x T, I x T, and P x T chi squares indicated that the experimental (Goodrich--special instruction and financial aid received) group had a significantly greater proportion of students with below average ACT scores than the nonexperimental freshmen, than the regular instruction financial aid recipients, and than the regular instruction nonfinancial aid recipients. In other words, the Goodrich special program had a significantly greater proportion of academically deficient students (previously defined as students with below average ACT scores) than the nonexperimental UNO program, than the nonexperimental financial aid program, and than the nonexperimental nonfinancial aid program. This may have been related to the high concentration of Blacks in the experimental program. Their general achievement/aptitude test scores usually have been significantly lower than the general achievement/aptitude test scores of Whites.[13] The Goodrich program had about 47 percent Blacks, whereas the nonGoodrich ACT freshman population had about 6 percent Blacks.

Analysis of the C x T chi square revealed that the nonexperimental financial aid recipients had a significantly greater proportion of below average ACT scores as compared to nonexperimental nonfinancial aid recipients. Thus, disadvantaged students (previously defined as students who received financial aid based on need) in the regular program had a greater proportion of academically deficient students than nondisadvantaged students in the regular program. These results may be related to other studies which suggested socioeconomic differences for standardized tests.[14]

Considering financial aid and ACT scores (F x T), it was apparent that financial aid recipients had a higher percentage of below average ACT scores than nonfinancial aid recipients. Thus, the proportion of academically deficient students was greater for financial aid recipients (disadvantaged students) than for nonfinancial aid recipients (nondisadvantaged students). These results, namely, that disadvantaged students had a greater percentage of below average general achievement/aptitude test scores than nondisadvantaged students, were related to the findings of Merritt[15] and Baird.[16]

In every instance involving race and general achievement/aptitude (R x T), Blacks tended to be overrepresented with below average ACT scores and Whites tended to be overrepresented with average and above average ACT scores. Many studies have reported similar racial differences with regard to general achievement/aptitude tests.[17] However, it was difficult to differentiate between the effects of race and socioeconomic status. In this study about two thirds of the Blacks were disadvantaged (i.e., they received financial aid based on need). Several studies have reported lower test scores for disadvantaged minority students as opposed to nondisadvantaged nonminority students.[18]

In every chi square involving grades and general achievement/aptitude test scores (G x T), persons with below average grades had greater percentage or proportion of below average ACT scores than persons with average or above average grades; persons with average or above average grades had a greater percentage or proportion of average and above average ACT scores than persons with below average grades. This trend was most pronounced for the experimental (Goodrich) subjects. Thus, it appeared that the grades of experimental subjects tended to be more closely related to ACT scores than were the grades of nonexperimental freshmen. Several studies have reported comparable results.[19]

The significant A (attrition/persistence) by T (general achievement/aptitude) chi squares revealed that persisters had a greater percentage of average and above average ACT scores than dropouts. Baber and Caple,[20] Trapp, Pailthorpe, and Cope[21] suggested that dropping out was related to lower test scores. More important was the lack of significant relation between attrition/persistence and general achievement/aptitude for experimental subjects. In this instance, Goodrich persisters tended to have higher (average or above average) ACT scores, whereas, Goodrich dropouts tended to be evenly divided between lower (below average) and higher (average and above average) ACT scores.

In summary, the following null hypothesis was negated, namely, that with regard to ACT scores, there were no significant group, instruction, financial aid, race, sex, grade , or attrition differences for subjects in the ACT freshman population or subsets within this population. Large sample statistics revealed significant relationships between general achievement/aptitude and financial aid, race, grades, and attrition. Disadvantaged students, that is, financial aid recipients (regardless of the program they were in or instruction they received) had a greater percentage of below average ACT scores than nondisadvantaged students. Goodrich students (all financial aid recipients, and, therefore, all disadvantaged) had a greater percentage of below average ACT scores than disadvantaged students in the regular program. Blacks consistently had a greater percentage of below average ACT scores as compared to Whites. Generally, grades were closely related to ACT scores--persons with lower grades had a greater proportion of below average ACT scores than persons with higher grades, and vice versa. This was seen most dramatically for experimental (Goodrich) subjects. Attrition/persistence was related to ACT scores--persisters had a greater proportion of average/above average ACT scores than dropouts. However, this relationship did not achieve significance for Goodrich students. Sex was the only variable which did not differentiate ACT scores.

ACT: Product Moment Correlations

Denoted in Table 4.3 are product moment correlations with general achievement/aptitude (actual ACT Composite scores) as the dependent variable. The independent variables (see the rows, Table 4.3) were:

Table 4.3

ACT: Product Moment Correlations

		Subjects				
		All	FinancialAid		Race	
			R	N	B	W
Variables						
U x Ta:						
tot.	r	.04	-.21*		-.05	-.07
	n	(150)	(100)		(70)	(80)
F x Ta:						
tot.	r	.11			.03	.03
	n	(150)			(70)	(80)
con.	r	.27			.13	.18
	n	(75)			(35)	(40)
R x Ta:						
tot.	r	.69**	.69**			
	n	(150)	(100)			
exp.	r	.70**	.70**			
	n	(75)	(75)			
con.	r	.67**	.59**	.66**		
	n	(75)	(25)	(50)		
S x Ta:						
tot.	r	-.06	-.10		-.12	-.07
	n	(150)	(100)		(70)	(80)
exp.	r	-.07	-.07		-.16	-.07
	n	(75)	(75)		(35)	(40)
con.	r	-.05	-.11	.05	-.08	-.08
	n	(75)	(25)	(50)	(35)	(40)
E x Ta:						
exp.	r	.24*	.24*		.10	.20
	n	(75)	(75)		(35)	(40)
G x Ta:						
tot.	r	.45**	.47**		.08	.50**
	n	(143)	(96)		(64)	(79)
exp.	r	.54**	.54**		.25	.70**
	n	(73)	(73)		(33)	(40)
con.	r	.37*	.18	.47*	-.21	.35
	n	(70)	(23)	(47)	(31)	(39)
A x Ta:						
tot.	r	.17	.23		.13	.14
	n	(150)	(100)		(70)	(80)
exp.	r	.23	.23		.22	.37
	n	(75)	(75)		(35)	(40)
con.	r	.12	.12	.13	.02	-.05
	n	(75)	(25)	(50)	(35)	(40)

*p<.05; **p<.01. (two tailed tests)

Subjects

All=all subjects in the specified sample: total; experimental; control

Financial Aid=R(recipients); N(nonrecipients)

Race=B(Blacks); W(Whites)

Sex=M(males); F(females)

Race & Sex=BM(Black males); BF(Black females); WM(White males); WF(White females)

(Legend continued on next page)

Table 4.3 (continued)

		Subjects					
		Sex		Race & Sex			
Variables		M	F	BM	BF	WM	WF
U x Ta:							
tot.	r	-.05	-.04	.11	.01	-.05	.08
	n	(68)	(82)	(32)	(38)	(36)	(44)
F x Ta:							
tot.	r	.03	.17	.01	.01	.03	.01
	n	(68)	(82)	(32)	(38)	(36)	(44)
con.	r	.14	.39	.24	.02	.14	.24
	n	(34)	(41)	(16)	(19)	(18)	(22)
R x Ta:							
tot.	r	.65**	.72**				
	n	(68)	(82)				
exp.	r	.70**	.70**				
	n	(34)	(41)				
con.	r	.61**	.73**				
	n	(34)	(41)				
S x Ta:							
tot.	r						
	n						
exp.	r						
	n						
con.	r						
	n						
E x Ta:							
exp.	r	.09	.38*	.31	-.16	.12	.33
	n	(34)	(41)	(16)	(19)	(18)	(22)
G x Ta:							
tot.	r	.35*	.56**	.07	.09	.38	.69**
	n	(65)	(78)	(30)	(34)	(35)	(44)
exp.	r	.52*	.55**	.17	.31	.76*	.64*
	n	(34)	(39)	(16)	(17)	(18)	(22)
con.	r	.21	.56**	-.19	-.21	.21	.74*
	n	(31)	(39)	(14)	(17)	(17)	(22)
A x Ta:							
tot.	r	.21	.15	.35	-.04	.00	.29
	n	(68)	(82)	(32)	(38)	(36)	(44)
exp.	r	.41	.09	.61	-.10	.28	.40
	n	(34)	(41)	(16)	(19)	(18)	(22)
con.	r	.07	.20	.05	.02	-.14	.13
	n	(34)	(41)	(16)	(19)	(18)	(22)

*p<.05; **p<.01. (two tailed tests)

Variables

Ta=Gen.Ach./Apt.(test): Actual ACT Composite scores
U=Group: 1(experimental); 2(control)
F=Financial Aid: 1(received); 2(not received)
R=Race: 1(Black); 2(White)
S=Sex: 1(male); 2(female)
E=Employment, hours: 1(0); 2(1-10); 3(11-20); 4(21-30); 5(31+)
G=Grades: 1(below avg.); 2(avg. & above avg.)
A=Attrition: 1(drop out); 2(persist)
r(product moment correlation); n(sample size)
tot. r=correlation of entire sample
exp. r=correlation of experimental sample
con. r=correlation of control sample

group (experimental, control); financial aid (received, not received); race (Black, White); sex (male, female); employment hours (0, 1-10, 11-20, 21-30, 31+); grades (below average, average and above average); and attrition (drop out, persist).

Correlations (for subjects, see the columns, Table 4.3) are presented for All subjects and for subjects categorized according to: financial aid (recipient , nonrecipient); race (Black, White); sex (male, female); race and sex (Black male, Black female, White male, White female).

The total r's, experimental r's, and control r's are listed consecutively for each set of variables. The total r refers to the correlation based on the entire sample of college students comprising a category; the experimental r refers to the correlation based on the experimental subjects comprising a category; the control r refers to the correlation based on the control subjects comprising a category.

The sample size for each correlation is listed directly below the coefficient. For example, consider the first column of Table 4.3 headed All subjects. The correlation between group and general achievment/aptitude for All subjects was .04, based on 150 subjects. The correlations between financial aid and general achievement/aptitude for 1) All subjects was .11, based on 150 subjects; 2) All control subjects was .27, based on 75 control subjects. And so forth.

Some variables did not have total r's, experimental r's, or control r's. For example, when considering U x Ta only a total r could be used because experimental subjects alone or control subjects alone could not be discriminated on the basis of U (group). The same was true for F x Ta with regard to experimental r's. All experimental subjects received financial aid, so F could not discriminate experimental subjects. The data for hours of employment were not available for control subjects.

Consequently, E was only pertinent for experi

Correlations indicated the degree of
ables. Another way of interpreting r was r^2,
cient of determination.[22] When multiplied by
centage of variance in one variable accounted
other variable. For example, the r of .04 be
eral achievement/aptitude) for All subjects (
cated that group accounted for less than one

When variables representing continuous
small number of classes the obtained correlati
In order to obtain a more realistic estimate
for coarse grouping were performed.[24] Include
ignations of obtained and corrected correlatio
Ta x E (general achievement/aptitude x employm
were corrected for coarse grouping, in keeping
tions of the data. Denoted in Table 4.3 are t
as Appendix B included the uncorrected Ta x E

Firstly, interpretations of the correl
ble 4.3) concentrated on the relationships for
lated to subjects. Secondly, data interpretati
ships for subjects (columns) as they related t

It should be noted that total r sample
jects and control subjects. That is, the total
of the experimental r's and the control r's.
three r's (total, experimental, and control) fo
and the same subjects (columns), there was conf
duplication. Since all experimental subjects w
the correlations pertaining to all experimental

exp. r for All subjects) were the same as the correlations pertaining to experimental financial aid recipients (see Table 4.3, exp. r for Financial aid recipients). For example, consider the R x Ta relationship for All subjects and for Financial aid recipients (Table 4.3, columns one and two). The experimental r for all subjects was .70, based on 75 subjects; the experimental r for Financial aid recipients was also .70, based on the same 75 subjects and the same data.

Despite the tabular limitations mentioned above (some confounding and duplication), trends were discerned. Significant correlations occurred between general achievement/aptitude (Ta) and 1) group (U), one out of ten times; 2) race (R), thirteen out of thirteen times; 3) employment (E), three out of ten times; and 4) grades (G), seventeen out of thirty-one times.

Generally, in relating U and Ta (group and general achievement/aptitude) there was little association between the group a person was in and his ACT scores. The U x Ta correlation was significant for financial aid recipients. In this instance, being in the experimental group was related to higher rather than lower ACT scores, and vice versa for control financial aid recipients. However, these findings may have been related to the racial composition of financial aid recipients in the experimental group and in the control group. Approximately 47 percent of the experimental financial aid recipients were Black, whereas, approximately 64 percent of the control financial aid recipients were Black. And as previously noted, Blacks tended to have significantly lower ACT scores than Whites.[25]

The R x Ta (race by general achievement/aptitude) correlations revealed that Blacks were very likely to have lower ACT scores than higher ACT scores; conversely, Whites were very likely to have higher ACT scores than lower ACT scores. All the R x Ta correlations were consistent, with regard to sign, and all were significant. These results, namely, the marked existance of racial differences with regard to general achievement/aptitude tests, commonly have been reported in the research literature.[26]

Hours employed (E) were related to ACT scores, and the trend was for more hours to be related to higher ACT scores, and less hours to be related to lower ACT scores. This was implied by many positive coefficients versus one negative coefficient. Three of the positive correlations (one a duplicate, note previous discussion in this section) were significant: E x Ta for All experimental subjects (experimental financial aid recipients) and for experimental females. Again, racial considerations may have been important. Considering all seventy-five experimental subjects, forty-one were employed for one or more hours; of those employed, two thirds were White. Likewise, of the forty-one experimental women, twenty-three were employed for one or more hours; of those employed, three fourths were White. Consequently, since more Whites were employed for more hours rather than less hours and since Whites had significantly higher ACT scores than Blacks (see ACT: Analyses of Variance and ACT: Chi Squares in this chapter), the significant E x Ta correlations may have been an artifact of the racial composition of the employment categories.

Grades (G) were closely related to general achievement/aptitude (Ta), with many positive significant correlations. Typically, persons with higher grades were more likely to have higher ACT scores. These results were often seen in the literature.[27] This relationship was not viable for control Blacks, control Black males, or control Black females, since their grade correlations with general achievement/aptitude were in an opposite direction, though not significant. Related to these results, Denmark, Shirk, and Hirsch,[28] and Bowers[29] reported that standardized test scores predicted GPA better for disadvantaged students in special programs than for regular or control students.

Considering the relationships for subjects (columns) as related to variables, several trends were noted. Generally for all subjects (first column of Table 4.3), higher ACT scores were significantly associated with being White, with being employed, and with having higher grades.

For financial aid recipients and nonfinancial aid recipients (columns two and three, Table 4.3) higher ACT scores were generally associated with being White and with having higher grades. Experimental financial aid recipients tended to have higher ACT scores than control financial aid recipients, but (as previously discussed) this may have been due to the racial makeup of the groups.

Directing attention at Whites (column five, Table 4.3), significant associations occurred for grades with ACT scores. That is, for total Whites and for experimental Whites, higher grades were closely associated with higher ACT scores. There were no significant correlations for Blacks (Table 4.3, column four). The major difference between Blacks and Whites was with regard to grades and ACT scores (G x Ta). However, the r's for Blacks tended to follow the patterns exhibited by Whites; that is, generally, the correlations were in the same direction but different in magnitude (Blacks usually lower). In part, this may have been the result of the restricted range of Blacks' ACT scores. That is, not only were Blacks' scores lower than the original ACT population scores, but their standard deviation of ACT scores was lower than the original ACT population standard deviation (see Appendix E). The restricted range of ACT scores lowered the correlations between Ta and other variables for Blacks. Although correction procedures were available for restricted range, they were only applicable to Pearson correlations.[30] Only one obtained correlation was Pearsonian (Ta x E) and that had been corrected for coarse grouping (see Appendix A). Consequently, corrections for restricted range (really corrections for restricted standard deviations) were not appropriate in this study.

For men and women (Table 4.3, second page, columns one and two) being White and having higher grades was positively related to higher ACT scores. A major difference between men and women was with employment and ACT scores. The E x Ta relationship was significant for women--women who worked more hours were more likely to have higher ACT scores. As previously discussed, this may have been related to the racial makeup of the employment categories.

Remaining for discussion are the subjects categorized by race and sex (Table 4.3, second page, columns three through six). There were no significant correlations for Black men or for Black women. This was in keeping with the overall pattern of Blacks (noted on the first page of Table 4.3, column four). This was probably the result of the Blacks' ACT scores being restricted in range. Between White men and White women (columns five and six), similarities were noted for grades and general achievement/aptitude. Higher grades tended to be positively and significantly related to higher ACT scores.

In summary, the following null hypothesis was negated, namely, that there were no correlational relationships which were significantly different from zero between ACT scores and financial aid, race, sex, grades, or attrition for the experimental group, control group or subsets within and between these groups. The correlational trends implied that higher ACT scores were very closely associated with being White; and higher ACT scores were closely associated with higher grades. Variables financial aid and attrition/persistence had no significant correlations with ACT Composite scores. No significant correlations were noted for Blacks (or Black men, or Black women). That is, none of the associations between ACT scores and other variables for said subjects were at a level better than chance. In part, this may have been the result of the restricted range of Blacks' ACT scores.

COLLEGE GRADES

The cumulative GPA descriptive data presented in Appendix F revealed that experimental subjects did consistently better academically than their control counterparts, especially students with average or above average ACT scores, Black females, and White males. However, as shown in Appendix G, Goodrich courses tended to elevate experimental GPA's. Consequently, the GPA differences between the groups may have been an artifact related to Goodrich courses. The experimental group and the control group manifested similar GPA trends. That is, attrition markedly delineated grades--dropouts had extremely lower mean GPA's than persisters. Grades were moderately distinguished by ACT scores and by race--persons with below average ACT scores and Blacks (males and/or females) had consistently lower mean GPA's than persons with average or above average ACT scores and Whites (males and/or females), respectively. Subjects categorized by financial aid or sex were not differentiated by grades.

Grades: Analyses of Variance

Analyses of variance VIII through XI (summarized in Table 4.4) investigated the effects of several variables upon college success, namely, grades. These analyses were designed to identify factors which could discriminate between college students with average or above average grades and college students with below average grades. Many of the factors among analyses were the same.

Table 4.4

Grades: Analyses of Variance

Analysis:	VIII	IX	X	XI
Number of Factors:	5	4	4	4
Factors:	U R S T A	I R S T	C R S T	P R S T
Criterion:	G	G	G	G
Significant Main Effects:	U** A**	T*		P* T*
Significant Interaction Effects:	ST*	IRST*	RST*	
Total N:	143	96	70	120
experimental n:	73	73	0	73
control n:	70	23	70	47

*p<.05; **p<.01.

Factors

U=Group: Experimental (Goodrich); Control
I=Instruction, financial aid received: Special instruction (Goodrich); Regular instruction
C=Control group, financial aid: Assistance received; Assistance not received
P=Programs: Special instruction and financial aid received (Goodrich); Regular instruction and no financial aid received
R=Race: Black; White
S=Sex: Male; Female
T=Gen. Ach./Apt. (test): Below avg.; Avg. and above avg.
A=Attrition: Dropout; Persister

Criterion

G=Grades: Below avg.; Avg. and above avg.

Factor U (group) was a significant main effect in the only analysis which included factor U in this series (see Table 4.4). The same was true for factor P (programs), and for factor A (attrition). Factor T, general achievement/aptitude, appeared in four of four analyses as a significant main effect or in a significant interaction. Sex, factor S, occurred in a significant interaction in three of four analyses and factor R, race, appeared in a significant interaction in two of four analyses. Factor I, instruction--financial aid received, occurred in one significant interaction (in the lone analysis including I). In an individual analysis of variance, when considering the same factors and subsets, interactions took precedence over main effects, and higher order interactions took precedence over lower order interaction.

These results revealed that grades were differentiated by group (U) and by programs (P). That is, experimental (Goodrich) subjects tended to receive higher grades than control subjects, and special instruction financial aid recipients (Goodrich) tended to receive higher grades than regular instruction nonfinancial aid recipients. These statements, and others throughout, could be stated conversely. Goodrich students appeared to be more successful than regular students with regard to grades. However, this may have been the result of averaging special (Goodrich) course grades (twelve hours per academic year) and regular course grades for experimental subjects, since the Goodrich course grades tended to be higher than the regular course grades (see Appendix G). Hendrix,[31] Somerville,[32] and Brown and others[33] reported similar results for other special programs. Furthermore, Goodrich subjects did not receive higher grades than regular instruction, financial aid recipients (that is, when financial aid was controlled, grades were not differentiated by instruction). Thus, one might assume a tendency for grades to be differentiated by financial aid rather than by instruction. But this relationship, between financial aid and grades, was not clear either, especially since factor C (control group, financial aid: assistance received, assistance not received) did not distinguish between students with higher grades or lower grades. That is, when instruction was controlled, grades were not differentiated by financial aid.

The problem alluded to above is that it could not be determined whether the higher grades of the Goodrich students were a reflection of the special courses, of receiving financial aid, or of the interaction of the two. One way to resolve the problem would be to offer Goodrich special courses to regular students who did not have financial aid. This would permit direct comparisons of grades for 1) financial aid recipients and nonfinancial aid recipients within the Goodrich program, and 2) nonfinancial aid recipients between the special instruction (experimental) group and the regular instruction (control) group. The former comparison would determine the relationship between financial aid and grades for Goodrich students; the latter comparison would determine the relationship between instruction and grades for nonfinancial aid recipients (Goodrich and regular).

Grades were also differentiated by attrition (A). Persisters tended to get higher grades than dropouts. This relationship, between attrition/persistence and grades, mirrored the results found in the research literature and reported, for example, by Aiken,[34] Blanchfield,[35] Conner,[36] Baber and Caple,[37] Cope,[38] and Hoffman.[39]

As expected,[40] factor T, general achievement/aptitude discriminated between students with below average grades and students with average or above average grades. In other words, students with higher ACT scores (fourteen or above) tended to get higher grades (2.0 or above, on a 4.0 scale) and students with lower ACT scores (below fourteen) tended to get lower grades (below 2.0, on a 4.0 scale). Analysis of the significant ST interaction (Analysis VIII) revealed that T produced a significant simple effect--T at S_2 ($F=7.906$, 1/111 df, $p<.01$). For a discussion of simple effects and criteria see the Data Analysis section, as well as Winer[41] and Kirk.[42] Thus, women with lower ACT scores tended to get lower grades than women with higher ACT scores. Analysis of the IRST and RST interactions revealed no significant simple effects according to the criteria ($<.001$ or $<.003$, respectively) denoted in the Data Analysis section. It should be understood that these significances or nonsignificances were also due, in part, to codifications and sample sizes.

In summary, the following null hypothesis was negated, namely, that there were no significant differences between the grades of the experimental group and the control group or the subsets within and between these groups. ACT scores were dynamic distinguishers of grades--persons with average and above average ACT Composite scores tended to get average and above average grades, and persons with below average ACT Composite scores tended to get below average grades. In addition, women with lower ACT scores tended to get lower grades than women with higher ACT scores, and vice versa. Generally, neither race nor sex significantly differentiated grades. The experimental (Goodrich) subjects--special instruction, financial aid recipients--received higher grades than control subjects, and higher grades than regular instruction nonfinancial aid recipients. But Goodrich course grades tended to elevate the GPA's of experimental students. Consequently, the grades differences may have been an artifact directly related to Goodrich course grades and indirectly related to financial aid and/or special instruction. As commonly reported in the literature, college persisters tended to have significantly higher grades than college dropouts.

Grades: Chi Squares

Chi squares (in this study, 2 by 2, that is, fourfold contingency tables) were used to indicate whether or not significant differences existed with regard to frequency data. One way of interpreting chi square was to consider the proportional differences between columns and rows. If the proportional differences between columns and rows were marked significance resulted. Of course, sample size was very important.

Table 4.5 denotes chi square relationships according to variables for subjects. The rows indicate the variables considered; the columns indicate the subjects (and subsets of subjects) considered. The chi squares in this study were based on the UNO ACT freshman population (maximum number of students who received grades = 1,156) and the following subsets (with fewer students): experimental freshmen, nonexperimental freshmen, nonexperimental financial aid freshmen, nonexperimental nonfinancial aid freshmen. For example, the U x G chi square (top row of Table 4.5) corresponds to the relationship between group and grades for the UNO ACT freshman population.

In Table 4.5, the significances for columns or rows are not necessarily mutually exclusive. The chi squares concerning grades revealed several significant trends. Reading down in Table 4.5, race (Blacks, Whites), and sex (males, females), separately produced significant results in two of three chi squares. General achievement/aptitude (below average, average and above average) produced significant results in five of five chi squares. The focus was upon grades as the dependent variable. The significances were determined by two-tailed tests.

Analysis of the R x G (race by grades) results indicated that for all freshmen, Whites tended to get average or above average grades but Blacks tended to be evenly divided between below average grades and aver-

Table 4.5

Grades: Chi Squares

UNO ACT Freshman Population			Experimental Freshmen			Nonexperimental Freshmen			Nonexperimental Financial Aid Freshmen			Nonexperimental Nonfinancial Aid Freshmen		
	N	p		n	p		n	p		n	p		n	p
U x G	1,156	ns												
I x G	239	ns												
C x G	1,083	ns												
P x G	990	ns												
F x G	1,156	ns												
R x G	699	<.01	R x G	73	ns	R x G	626	<.01						
S x G	1,156	<.01	S x G	73	ns	S x G	1,083	<.01						
T x G	1,156	<.01	T x G	73	<.01	T x G	1,083	<.01	T x G	166	<.01	T x G	917	<.01

Variables

U = Group: Experimental, Nonexperimental (control)
I = Instruction of Financial aid recipients: Special (Goodrich), Regular
C = Nonexperimental Group, Financial Aid: Assistance received, Assistance not received
P = Programs, Freshmen: Special instruction and financial aid received (Goodrich), Regular instruction and no financial aid received
F = Financial Aid: Assistance received, Assistance not received
R = Race: Blacks, Whites
S = Sex: Men, Women
T = Gen.Ach./Apt.: Below average, Average or above average
G = Grades: Below average, Average or above average

age or above average grades. For nonexperimental subjects, Whites tended to receive higher grades and Blacks tended to receive lower grades. More important was the lack of significant relationship between race and grades for experimental subjects. In this instance, experimental (Goodrich) subjects, both Blacks and Whites, tended to receive average or above average grades (without significant proportional differences, for an n of 73). But, the GPA's of experimental subjects included Goodrich course grades (twelve credits) which tended to be higher than regular course grades (see Appendix G). For a discussion in the literature on race and grades see Pandey,[43] Davis, Loeb, and Robinson,[44] and Sampel and Seymour;[45] for a discussion of special programs and grades see Hendrix,[46] Somerville,[47] and Brown and others.[48]

Considering the relationships between sex (S) and grades(G), for all freshmen and for nonexperimental freshmen, the proportion of women receiving average and above average grades was significantly greater than the proportion of men receiving average and above average grades. Several researchers have noted similar sex differences with regard to grades.[49] Whereas, for experimental (Goodrich) subjects, the proportional relationships for men and women tended to be the same. That is, both sexes tended to be overrepresented by higher grades and to the same extent. As stated above, Goodrich course grades tended to inflate experimental students' GPA's.

In every instance involving general achievement/aptitude (T) and grades (G), persons with average or above average ACT scores tended to get average or above average grades. These findings were in keeping with the research literature.[50] The relationships for persons with below average ACT scores and grades were not as clear cut. All freshmen, nonexperimental freshmen, and nonexperimental nonfinancial aid recipients with lower ACT scores tended to be overrepresented with lower grades; whereas, experimental freshmen and nonexperimental, financial aid recipients with lower ACT scores tended to be evenly divided between lower grades and higher grades. Consequently, for students engaged in special programs or for students who received financial aid, below average ACT scores were not necessarily related to below average grades. Remembering that subjects with below average ACT scores were predominantly Black, the results seemed to conform with previous findings, viz., that the relationship between test scores and grades for Blacks and, generally, for disadvantaged students is unstable when they are engaged in special programs.[51] Also, as previously noted, Goodrich course grades appeared to elevate experimental students' GPA's.

In summary, the following null hypothesis was negated, namely, that with regard to grades, there were no significant group, instruction, financial aid, race, sex, or general achievement/aptitude differences for subjects in the ACT freshman population, or subsets within this population. Racial differences with regard to grades (Blacks lower) appeared for all freshmen and nonexperimental freshmen, but not for the experimental (Goodrich) freshmen. That is, the experimental treatment (including higher Goodrich course grades) seemed to neutralize racial differences with regard to grades. Sex differences with regard to grades (men lower) appeared for all freshmon and nonexperimental freshmen, but not for the Goodrich freshmen. That is, the experimental treatment (including higher Goodrich course grades) seemed to neutralize sex differences with regard to grades. Generally, ACT scores were closely related to grades--persons with higher test scores had a greater proportion of average and above average grades than persons with lower test scores; conversely, persons with lower test scores had a greater proportion of below average grades than persons with higher test scores. The latter relationship was negated for students who received special Goodrich instruction and/or financial aid.

Grades: Product Moment Correlations

Denoted in Table 4.6 are product
grades (below average, average and above avera
able. The independent variables (see the rows
(experimental, control); financial aid (receiv
achievement/aptitude (actual ACT Composite sco
sex (male, female); and employment hours (0, 1

Correlations (for subjects, see the co
sented for All subjects and for subjects categ
cial aid (recipient, nonrecipient); general ac
average, average or above average); race (Blac
male); race and sex (Black male, Black female,

The total r's, experimental r's, and c
secutively for each set of variables. The tot
tion based on the entire sample of college sub
the experimental r refers to the correlation b
subjects comprising a category; the control r
based on the control subjects comprising a cat

The sample size for each correlation is
coefficient. For example, consider the first
All subjects. The correlation between group an
was -.21, based on 143 subjects. The correlat
and grades for 1) All subjects was -.15, based
control subjects was -.02, based on 70 control

Some variables did not have total r's,
trol r's. For example, when considering U x G
used because experimental subjects alone or con
not be discriminated on the basis of U (group).
F x G with regard to experimental r's. All exp
ceived financial aid, so F could not discrimina

Table 4.6

Grades: Product Moment Correlations

		Subjects				
		All	FinancialAid		Gen.Ach./Apt.(test)	
			R	N	BA	A&AA
Variables						
U x G:						
tot.	r	-.21*	-.16		-.08	-.26*
	n	(143)	(96)		(58)	(85)
F x G:						
tot.	r	-.15			-.13	-.20
	n	(143)			(58)	(85)
con.	r	-.02			-.10	.08
	n	(70)			(31)	(39)
Ta x G:						
tot.	r	.45**	.47**			
	n	(143)	(96)			
exp.	r	.54**	.54**			
	n	(73)	(73)			
con.	r	.37*	.18	.47*		
	n	(70)	(23)	(47)		
R x G:						
tot.	r	.33**	.34**		-.01	.31**
	n	(143)	(96)		(58)	(85)
exp.	r	.29*	.29*		-.02	.18
	n	(73)	(73)		(27)	(46)
con.	r	.35**	.32	.33*	.09	.40*
	n	(70)	(23)	(47)	(31)	(39)
S x G:						
tot.	r	.09	-.02		-.03	.26*
	n	(143)	(96)		(58)	(85)
exp.	r	-.02	-.02		-.06	.16
	n	(73)	(73)		(27)	(46)
con.	r	.20	-.11	.30*	-.03	.36*
	n	(70)	(23)	(47)	(31)	(39)
E x G:						
exp.	r	.25	.25		.32	-.01
	n	(73)	(73)		(27)	(46)

*p<.05; **p<.01. (two tailed tests)

Subjects

All=all subjects in the specified sample: total; experimental; control

Financial Aid=R(recipients); N(nonrecipients)

Gen.Ach//Apt.(test)=BA(S's w/ below avg. ACT scores); A&AA(S's w/ avg. & above avg. ACT scores)

Race=B(Blacks); W(Whites)

Sex=M(males); F(females)

Race & Sex=BM(Black males); BF(Black females); WM(White males); WF(White females)

(Legend continued on next page)

Table 4.6 (continued)

		Subjects							
		Race		Sex		Race & Sex			
Variables		B	W	M	F	BM	BF	WM	WF
U x G:									
tot.	r	-.24	-.17	-.33**	-.07	-.25	-.15	-.35*	.09
	n	(64)	(79)	(65)	(78)	(30)	(34)	(35)	(44)
F x G:									
tot.	r	-.18	-.19	-.32**	.01	-.17	-.10	-.40*	.07
	n	(64)	(79)	(65)	(78)	(30)	(34)	(35)	(44)
con.	r	-.01	-.05	-.07	.11	.03	-.15	-.31	.17
	n	(31)	(39)	(31)	(39)	(14)	(17)	(17)	(22)
Ta x G:									
tot.	r	.08	.50**	.35*	.56**	.07	.09	.38	.69**
	n	(64)	(79)	(65)	(78)	(30)	(34)	(35)	(44)
exp.	r	.25	.70**	.52*	.55**	.17	.31	.76*	.64*
	n	(33)	(40)	(34)	(39)	(16)	(17)	(18)	(22)
con.	r	-.21	.35	.21	.56**	-.19	-.21	.21	.74*
	n	(31)	(39)	(31)	(39)	(14)	(17)	(17)	(22)
R x G:									
tot.	r			.20	.40**				
	n			(65)	(78)				
exp.	r			.23	.26				
	n			(34)	(39)				
con.	r			.13	.47**				
	n			(31)	(39)				
S x G:									
tot.	r	.04	.17						
	n	(64)	(79)						
exp.	r	-.03	-.07						
	n	(33)	(40)						
con.	r	.01	.33*						
	n	(31)	(39)						
E x G:									
exp.	r	.18	.25	-.02	.48*	.13	.23	-.23	.62*
	n	(33)	(40)	(34)	(39)	(16)	(17)	(18)	(22)

*p<.05; **p<.01. (two tailed tests)

Variables

G=Grades: 1(below avg.); 2(avg. & above avg.)
U=Group: 1(experimental); 2(control)
F=Financial Aid: 1(received); 2(not received)
Ta=Gen.Ach./Apt.(test): Actual ACT Composite scores
R=Race: 1(Black); 2(White)
S=Sex: 1(male); 2(female)
E=Employment, hours: 1(0); 2(1-10); 3(11-20); 4(21-30); 5(31+)

r(product moment correlation); n(sample size)
tot. r=correlation of entire sample
exp. r=correlation of experimental sample
con. r=correlation of control sample

The data for hours of employment were not available for control subjects. Consequently, E was only pertinent for experimental subjects.

Correlations indicated the degree of relationship between two variables. Another way of interpreting r was r^2, sometimes called the coefficient of determination.[52] When multiplied by 100, r^2 indicated the percentage of variance in one variable accounted for by the variance in the other variable. For example, the r of -.21 between U (group) and G (grades) for All subjects (see Table 4.6, top row) indicated that group accounted for about four percent of the grade variance.

When variables representing continuous data were grouped into a small number of classes the obtained correlations were lowered somewhat.[53] In order to obtain a more realistic estimate of correlation, corrections for coarse grouping were performed.[54] Unlike a Pearson correlation corrected for coarse grouping, a phi corrected for coarse grouping was no longer a phi, per se. Rather it was an estimate of a point biserial correlation or an estimate of a Pearson correlation, depending on whether one or two variables were assumed continuous. Included in Appendix A are the designations of obtained and corrected correlations. Included in Appendix C are the uncorrected correlations, whereas, included in Table 4.6 are the final correlations (some of which required correction, and some of which did not).

Firstly, interpretations of the correlation data (presented in Table 4.6) concentrated on the relationships for variables (rows) as they related to subjects. Secondly, data interpretations focused on the relationships for subjects (columns) as they related to variables.

It should be noted that total r samples included experimental subjects and control subjects. That is, the total r's were not independent of the experimental r's and the control r's. Thus, when considering all three r's (total, experimental, and control) for the same variables (rows) and the same subjects (columns), there was confounding. There was also some duplication. Since all experimental subjects were financial aid recipients, the correlations pertaining to all experimental subjects (Table 4.6, see exp. r for All subjects) were the same as the correlations pertaining to experimental financial aid recipients (Table 4.6, see exp. r for Financial aid recipients). For example, consider the Ta x G relationship for All subjects and for Financial aid recipients (Table 4.6, columns one and two). The experimental r for All subjects was .54, based on 73 subjects; the experimental r for Financial aid recipients was also .54, based on the same 73 subjects and the same data.

Despite the tabular limitations mentioned above (some confounding and duplication), trends were discerned. Significant correlations occurred between grades (G) and 1) group (U), four out of twelve times; 2) financial aid (F), two out of twenty-two times; 3) general achievement/aptitude (Ta), seventeen out of thirty-one times; 4) race (R), ten out of nineteen times; 5) sex (S), four out of nineteen times; and 6) employment (E), two out of twelve times.

Generally, in relating U and G (group and grades), persons in the experimental group were more likely to receive average or above average grades than were persons in the control group (note the number of negative correlations versus one positive correlation). The U and G correlations were significant for 1) all subjects; 2) subjects with average or above average ACT scores; 3) men; and 4) White men. Several studies have reported comparable results, that is, students in special programs receive better grades than control students.[55]

The F x G correlations (financial aid by grades) revealed that, generally, persons who received financial aid were more likely to receive higher grades than lower grades. Consider the number of negative coefficients (more) versus positive coefficients (less). This relationship was significant for men (total r), and for White men (total r).

ACT scores (Ta) were closely related to grades (G), with many positive significant correlations. Typically, the higher a person's ACT score the more likely he was to obtain average or above average grades. These results were in keeping with the great majority of the research literature involving general achievement/aptitude and grades.[56] This relationship was not viable for control Blacks, control Black males, or control Black females, since their ACT correlations with grades were in an opposite direction, though not significant. This relationship was also not viable for total Blacks, total Black males, and total Black females, since their ACT correlations with grades were close to zero. A problem was noted here, that of restricted range for Blacks. The standard deviation of their ACT scores was smaller than the standard deviation of the original ACT population (data not shown). This resulted in a lowered Ta x G correlation for Blacks. Although correction procedures were available for restricted range, they were only applicable to Pearson correlations.[57] Consequently, the correction procedures could not be used in this instance, since Ta x G correlations were biserial r's (see Appendix A).

For R x G (race by grades), Whites were usually more likely to receive average or above average grades than were Blacks. Studies by Pandey[58] and by Stanley and Porter[59] included similar results. Only two correlations were negative and coefficients of -.01 and -.02 are close enough to zero to make the sign meaningless. There were many positive significant correlations.

For sex with grades (S x G), more of the correlations had a positive sign and less had a negative sign (for total r's, and for control r's).

However, the positive coefficients tended to be higher, and four were significant. The positive significant correlations between sex and grades favored women, that is, women tended to receive higher grades than men. Baron,[60] Veldman,[61] and Foster and Jenkins[62] offered additional support for such findings. However, experimental r's were very low and countertrend (more negative than positive). The coefficients basically indicated a lack of association between sex and grades for experimental subjects. In other words, the Goodrich program seemed to negate the association between sex and grades.

Hours employed (E) were related to grades (G), and the trend was for more hours to be related to higher grades and less hours to be related to lower grades. This was implied by many positive coefficients versus three negative coefficients (two of which were -.01 and -.02). Two of the positive correlations were significant: E x G for females, and for White females. Baron reported that student academic success was more probable for those who planned to work part-time.[63] The employment category was especially interesting for interpretation. One could not assume causality, that is, put a person to work and she will become a good student. However, the kind of person who worked may have had, for example, higher motivation. Many explanations were possible.

Considering the relationships for subjects (columns) as related to variables, several trends were noted. Generally for All subjects (first column, Table 4.6), higher grades were significantly associated with being in the experimental group (U), with having higher ACT scores, and with being White. However, the former (U) may have been the result of experimental grades being elevated by Goodrich courses.

For financial aid and nonfinancial aid subjects (columns two and three, Table 4.6), higher grades were generally associated with higher ACT scores and with being White. Sex produced a significant relationship with grades when persons did not receive financial aid. That is, for nonfinancial aid recipients, women were more closely associated with higher grades than lower grades, and vice versa for men. This trend was negated when persons received financial aid.

Directing attention at students with average or above average general achievement/aptitude (column five, Table 4.6), significant associations occurred for group, race, and sex with grades. That is, for total subjects with average or above average ACT scores (note total r's), being in the experimental group, being White, or being a woman was significantly related to higher grades. Control subjects with average or above average ACT scores (note control r's), exhibited similar significant relationships with regard to being White, or being a woman,and high grades. Experimental subjects with average or above average ACT scores (note experimental r's) showed no significant relationships with grades. That is, none of the predictive associations with grades held for experimental subjects with higher ACT scores. More importantly, for subjects with below average ACT scores there were no significant correlations. Of the ten correlations listed (fourth column, Table 4.6), seven were opposite the trends noted for subjects with average and above average ACT scores. Of greater consequence, nine of the correlations had an absolute value of .13 or less, which suggested lack of association between grades and other variables for these students. Only E (employment, hours) showed potential as a possible predictor of grades for experimental subjects with below average ACT scores. Thus, the prediction of achievement for academically deficient students may require different variables than those used for the majority of students. Generally, the research literature has not considered predictive relationships for high risk (or marginal) students unless they were enrolled in special programs.[64]

Considering White subjects (Table 4.6, second page, second column) it was apparent that the only significant relationships were between ACT scores and grades (for total Whites and for experimental Whites) and between sex and grades (for control Whites). That is, higher ACT scores were closely associated with higher grades for Whites generally, and for experimental Whites, specifically. And being a woman was positively related to higher grades for control Whites. There were no significant correlations for Blacks (Table 4.6, second page, first column). However, the r's for these subjects tended to follow the patterns exhibited by Whites; that is, generally, the correlations were in the same direction but differed in magnitude (Blacks usually lower). The major differences between Blacks and Whites were with regard to ACT scores.

Between men and women (Table 4.6, second page, columns three and four), major differences were noted with regard to group, financial aid, race, and employment. The former variables (U and F) resulted in significant correlations for men; the latter variables (R and E) resulted in significant correlations for women. Generally, for women, higher grades were significantly related to having higher ACT scores, being White, or working more hours. Generally, for men, higher grades were significantly related to being in the experimental group, receiving financial aid, or having higher ACT scores.

Remaining for discussion are the subjects categorized by race and sex (Table 4.6, second page, columns five through eight). There were no significant correlations for Black men or for Black women. This was in keeping with the overall pattern of Blacks (noted in column one). Thus, the grades of Black subjects could not be adequately predicted, even when sex was considered (whether for total r, experimental r, or control r).

Between White men and White women (columns seven and eight), similarities were noted for general achievement/aptitude and grades. Higher ACT scores tended to be positively and significantly related to higher grades. Between White men and White women, differences were noted for group, for financial aid, and for employment with grades. For White men, being in the experimental group or receiving financial aid was related to higher grades. For White women, working more hours was positively related to higher grades.

In summary, the following null hypothesis was negated, namely, that there were no correlational relationships which were significantly different from zero between grades and financial aid, general achievement/aptitude, race, or sex for the experimental group, control group, or subsets within and between these groups. The correlational trends implied that higher grades were closely associated with higher ACT scores; higher grades were moderately associated with being White, with being female, and with being in the experimental group; higher grades were mildly associated with receiving financial aid, and with being employed, for more hours rather than less hours. No significant correlations were noted for subjects with below average ACT scores. In other words, there was a lack of association between grades and other variables for said subjects. No significant correlations were noted for Blacks (or Black men, or Black women). That is, none of the associations between grades and other variables for said subjects were at a level better than chance.

Grades: Multiple Predictions

Multiple correlations were determined for the same groups or subgroups of college students that were considered for the single correlations. However, the nonsignificant multiple correlations were not shown in this study. The variables and sample sizes; significant multiple correlations and their standard errors, uncorrected and corrected; regression equations;

Table 4.7

Grades: Multiple Predictions

Subjects	n	R	SE	Regression Equation	Correlation w/ Add. Variables				cR^1	cSE^1
					r	Rw/2	Rw/3	Rw/4		
All	143	.50**	.42	1.15 + .03Ta- .19F + .09S + .05R	.45	.49	.50	.50	.47**	.43
All	143	.50**	.42	1.33 + .03Ta- .23U + .10S + .05R	.45	.49	.50	.50	.47**	.43
Exp.	73	.57**	.38	1.16 + .05Ta+ .05E - .16R	.54	.56	.57	$S^\dagger$	.55**	.38
Con.	70	.45**	.46	.80 + .02Ta+ .19S + .18R - .10F	.37	.42	.44	.45	.40**	.47
Fin. Aid Rec.	96	.48**	.42	1.18 + .03Ta- .08U + .04R + .03S	.47	.47	.48	.48	.44**	.43
No Fin. Aid Rec.	47	.54**	.44	.60 + .04Ta+ .27S - .03R	.47	.54	.54		.49**	.45
Whites	79	.57**	.36	.91 + .04Ta+ .17S - .18F	.50	.54	.57		.55**	.37
Whites	79	.55**	.37	.86 + .04Ta+ .17S - .12U	.50	.54	.55		.53**	.37
Males	65	.47**	.45	1.64 + .03Ta- .32F - .02R	.35	.47	.47		.43**	.46
Males	65	.46**	.44	1.65 + .02Ta- .30U	.35	.46	$R^\dagger$		.43**	.45
Females	78	.57**	.39	1.08 + .04Ta- .08F + .02R	.56	.57	.57		.54**	.40
Females	78	.56**	.40	1.05 + .04Ta- .04U + .01R	.56	.56	.56		.54**	.40
S's A & AA ACT	85	.49**	.38	1.75 + .39R - .26S - .21F	.31	.43	.49		.46**	.39
S's A & AA ACT	85	.51**	.37	1.23 + .35R - .28S + .24U	.31	.43	.51		.48**	.38
White Males	35	.56**	.40	1.62 - .39F + .03Ta	.40	.56			.52**	.42
White Males	35	.50*	.42	1.57 + .03Ta- .30U	.38	.50			.45*	.43

(Legend next page)

Table 4.7 (continued)

Subjects	n	R	SE	Regression Equation	Correlation w/ Add. Variables				cR[1]	cSE[1]
					r	Rw/2	Rw/3	Rw/4		
White Females	44	.69**	.29	.63 + .06Ta+ .04F	.69	.69			.68**	.29
White Females	44	.71**	.28	.49 + .06Ta+ .11U	.69	.71			.69**	.29
Exp. Whites	40	.71**	.28	.75 + .05Ta+ .05E - .05S	.70	.71	.71		.68**	.29
Con. Whites	39	.51*	.42	.81 + .03Ta+ .33S - .14F	.35	.50	.51		.45*	.44
Exp. Males	34	.55*	.39	1.24 + .05Ta- .23R - .02E	.52	.55	.55		.48*	.42
Exp. Females	39	.68**	.35	1.25 + .05Ta+ .15E - .30R	.55	.64	.68		.64**	.36
Con. Females	39	.58**	.41	.97 + .04Ta- .13F + .15R	.56	.57	.58		.53**	.43
Con. S's A & AA ACT	39	.54**	.42	.11 + .47R + .35S + .08F	.40	.53	.54		.48**	.44
Exp. White Males	18	.82**	.23	.59 + .07Ta- .13E	.76	.82			.79**	.25
Exp. White Females	22	.78**	.26	.75 + .04Ta+ .17E	.64	.78			.75**	.28
Con. White Females	22	.74**	.27	.51 + .07Ta	.74	F†				

*p<.05; **p<.01. (two tailed tests)

† indicates variable was not included in the regression equation because it was insufficient to add to the multiple R.

Variables

Ta = Gen. Ach./Apt. (test): Actual ACT Composite scores
F = Financial Aid: 1(received); 2(not received)
S = Sex: 1(male); 2(female)
R = Race: 1(Black); 2(White)
U = Group: 1(experimental); 2(control)
E = Employment, hours: 1(0); 2(1-10); 3(11-20); 4(21-30); 5(31+)

[1] J. P. Guilford & B. Fruchter, Fundamental Statistics in Psychology and Education (New York: McGraw Hill, 1973), pp. 366-367.

and stepwise correlations are listed in Table 4.7, on two pages. All decimal terms were rounded off to hundredths.

Multiple regression included optimal weights for predictors of criterion (for example, grades). Multiple predictors can also be interpreted in terms of R^2, often referred to as the coefficient of multiple determination.[65] When multiplied by 100, R^2 indicated the percentage of variance accounted for in the dependent variable by the variance in the predictor variables, taken collectively. For example, in the top row of Table 4.7, the cR of .47 for all subjects indicated that about 22 percent of the grade variance was accounted for by the predictor variables of Ta (general achievement/aptitude), F (financial aid), S (sex), and R (race).

Corrections for R's (resulting in cR's) and for SE's (resulting in cSE's) were required because of the relatively large number of predictor variables employed with small samples.[66] Uncorrected, the R's tended to be larger and the SE's tended to be smaller. The last row (second page, Table 4.7) includes a single rather than a multiple regression equation. Therefore, neither a cR nor cSE is listed.

The column labeled "r" lists the highest single correlation with grades for the subjects in question. The remaining columns--Rw/2, Rw/3, Rw/4--list the multiple R's obtained with the addition of each new variable in the stepwise regression procedure. In other words, the correlation r relates to the first (letter) variable in the regression equation; the correlation Rw/2 relates to the first two (letter) variables; and so forth. That is, Rw/2 means multiple correlation with two variables (the first two letter variables which contributed most to the coefficient). "Stepwise" referred to the addition of the most influential variables, in order. For example, considering All subjects (Table 4.7, top row) general achievement/aptitude scores (Ta) correlated with grades .45; general achievement/aptitude scores (Ta) and financial aid (F) correlated with grades .49; and so forth.

In some instances, variables considered for the stepwise regression proved to be insufficient for inclusion in the equation. That is, the F level or the tolerance level for the variable was insufficient to warrant further computation. If the F level was too small, it meant that the variable was not worth adding for it contributed so little. If the tolerance level was too small, it meant that the variable was nearly a linear expression of the variables already in the equation. Variables which were not incorporated into an equation are denoted by the superscript †. For example, the regression equation for experimental subjects (third row of Table 4.7) did not include sex (S) as a predictor variable because additional computation was unwarranted.

In several cases, addition of a variable into the regression equation did not increase the coefficient enough to change the tenths or hundredths place of the R. For example, considering financial aid recipients (row five in Table 4.7), the correlation of general achievement/aptitude test scores (Ta) with grades was .47; the multiple correlation of general achievement/aptitude (Ta) and group (U) with grades was also .47. That is, the addition of group (U) did not increase the correlation coefficient when rounding to hundredths.

Variables U (group: experimental, control) and F (financial aid: assistance received, assistance not received) were confounded. That is, they were not independent of each other. Being in the experimental group automatically meant that a student received financial aid. To avoid confounded variables in the same regression equation, separate equations were computed--one which included U and excluded F; one which included F and excluded U. For example, the first two equations in Table 4.7 apply to all students. The first equation includes

chievement/aptitude), F (financial aid), S (se

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jects. Only multiple predictors which pertaine

tal subjects included variable E. For example,

White females (second page, rows one and two, T

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necessarily independent of each other. There w

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In one equation (second page, last row,

regression resulted with ACT (Ta) as the only p

equations are multiple predictors. Ta was the f

two of twenty-six significant multiple R's. In

multiple predictors there appeared to be no sign

ACT as a single predictor and ACT as part of a m

For example, in the first row of Table 4.7, the

was .45 and accounted for approximately 20 percent

cR for grades was .47 and accounted for approximat

variance. ACT Composite scores were the prime p generally, ACT scores alone were adequate for the significant prediction of grades. These results were in keeping with the findings of several researchers.[67]

Three of the twenty-six significant multiple predictors could not consider Ta as a predictor variable because the subjects were identified according to their ACT scores (for example, row thirteen, Table 4.7). In each of these multiple correlations, race (R) was the first variable contributing to the coefficient. In other words, for subjects identified as having average or above average ACT scores, race accounted for the plurality of the grade variance. However, the correlations for these subjects were appreciably enhanced by the addition of sex (S) and group (U) or financial aid (F) as predictors.

One of the twenty-six significant multiple predictors had financial aid (F) as the first contributor to the coefficient (row fifteen, Table 4.7). But, Ta as the other contributor, appreciably enhanced the correlation.

Other trends, for subjects or factors, were noted. Grades for Whites were much more predictable than grades for Blacks. None of the multiple predictors for Blacks were significant. Failure to predict grades from general achievement/aptitude tests for Blacks was also reported by Clark and Plotkin.[68] As previously mentioned (under ACT or Grades: Product Moment Correlations), the variability of Black ACT scores was restricted, which produced lowered single correlations. Corrections were available but not for use in this study.[69] Consequently, resultant multiple correlations for Blacks were also lowered as they reflected the effects of restricted range.

Generally, multiple predictions of grades were higher for women than for men. Irvine,[70] Lindsay and Althouse,[71] Stanley,[72] and Michael and others[73] also reported higher correlations for women between traditional predictors and college success. That is, women were more predictable than men with regard to achievement.

Typically, the multiple correlations of grades were higher for experimental subjects than for control subjects. In other words, experimental subjects were more predictable, in terms of grades, than control subjects. Comparable findings have been reported in the literature.[74]

Generally, for subjects categorized according to race, sex, and/or group, going from a single factor subset to a double factor subset to a triple factor subset did not necessarily increase the multiple correlations for grades. But, specifically, it did increase the multiple correlations for Whites, women, and experimental subjects. In other words, it was obvious (from Table 4.7) that the significant multiple predictions rose in going from a single factor (Whites, or females, or experimental subjects) to a dyadic factor (White females, or experimental Whites, or experimental females) to the triadic factor (experimental White females).

The grades of students with average or above average ACT scores were more predictable than the grades of students with below average ACT scores. None of the multiple predictors for the latter group reached significance.

There was little difference in the predictability of grades for financial aid recipients and nonfinancial aid recipients. Kinney presented data which support these findings.[75]

In predicting grades, the cR's for all subjects (top two rows of Table 4.7) were .47 and the range of significant correlations was from .40 to .79. Thus, it was apparent that considering various groups and subgroups was more efficacious than arbitrarily considering all subjects together. Some groups and subgroups were less predictable than others and using the same equation (developed for all subjects) with these subjects produced misleading results. Conversely, some groups and subgroups were more predictable than others and so forth. Thus, more accurate results were obtained with separate regression equations for groups and subgroups.

To test the efficiency of the regression equations with large samples, obtained grades (1-below average, 2-average or above average) were compared with predicted grades (developed from the regression equations) for all subjects and for financial aid subjects. Arbitrarily using the median of the predicted grades as the cut off point (that is, scores below the median were designated as below average grades, scores equal to or above the median were designated as average or above average grades), predictions for all subjects were accurate approximately 70 percent of the time (using either multiple regression equation, top two rows of Table 4.7). That is, approximately 70 percent of the predicted grades accurately corresponded to the obtained grades. Considering the results in another way, about 76 percent of the subjects who actually received below average grades were designated to receive below average grades according to their predicted scores; about 66 percent of the subjects who actually received average or above average grades were designated to receive average or above average grades according to their predicted scores. Analogously, using the median of the predicted grades as the cut off point, predictions for financial aid subjects were accurate approximately 69 percent of the time (using multiple regression equation, row five of Table 4.7). And about 80 percent of the financial aid subjects who actually received below average grades were designated to receive below average grades according to their predicted scores; about 64 percent of the financial aid subjects who actually received average or above average grades were designated to receive average or above average grades according to their predicted scores.

It should be noted that cut off points can be arbitrarily chosen to maximize predictive efficiency--for overall grades, for lower grades, or for higher grades. But the median technique is well known and popular. In the instances above, choosing a cut off below the median would have increased the overall and higher grade percentages. Not many students received lower grades.

In summary, the following null hypothesis was negated, namely, that there were no significant multiple predictors of grades for subjects in the experimental and control sample, or subsets within this sample. ACT scores accounted for the greatest amount of grade variance for most subjects (groups and subgroups). Furthermore, grades were adequately predicted for the majority of groups and subgroups using ACT scores alone. That is, developing multiple predictors often did not appear necessary. Generally, the grades of Whites, of females, and of experimental subjects were most predictable. For Whites, females, or experimental subjects multiple predictions increased going from a single factor (of race or sex or group), to a dyadic factor, to the triadic factor. The grades of Blacks and of subjects with below average ACT scores could not be predicted better than chance. The former may have been due to the restricted range of Black ACT scores which lowered the single correlations and resultant multiple predictors. Developing separate regression equations for groups and subgroups produced more accurate results. The overall accuracy of the regression equations in the prediction of grades for persons in large samples was about 70 percent (using a median cut off technique).

COLLEGE ATTRITION/PERSISTENCE

The attrition/persistence descriptive data presented in Appendix H revealed that the Goodrich program was more effective than the regular program in keeping freshmen, especially Blacks and men, in school. However, this seemed to be produced by Goodrich courses elevating experimental GPA's, as higher grades were conducive to persistence. The Goodrich program also seemed to negate, and occasionally reverse, the control racial and sex persistence patterns which favored Whites and women. For both groups (experimental and control), general achievement/aptitude and grades, especially the latter, distinguished dropouts and persisters. Financial aid did not appear to affect attrition among experimental and control subjects.

Attrition/Persistence: Analyses of Variance

Analyses of variance XII through XVIII (summarized in Table 4.8) investigated the effects of several factors upon attrition/persistence. These analyses attempted to identify factors which could be employed in the prediction of college students who were persisters and college students who were dropouts. Many of the factors among analyses were the same.

Factor T, general achievement/aptitude, produced a significant main effect in one of four analyses. Factor R, race, appeared once in seven analyses as a significant main effect. Grades, factor G, resulted in a significant main effect and/or in a significant interaction in four of four analyses. Sex, factor S, occurred twice in seven analyses in significant interaction. Factor I, instruction--financial aid received, and factor C, control group--financial aid, each occurred in a significant interaction in one of two analyses. In an individual analysis of variance, when considering the same factors and subsets, interactions took precedence over main effects, and higher order interactions took precedence over lower order interactions.

These results indicated that no strong statements can be made with regard to ACT scores differentiating dropouts and persisters in small samples. When factor T was successful in this regard (once in four analyses)

Table 4.8

Attrition/Persistence: Analyses of Variance

Analysis:	XII	XIII	XIV	XV	XVI	XVII	XVIII
Number of Factors:	5	4	4	4	4	4	4
Factors:	U R S T G	I R S T	I R S G	C R S T	C R S G	P R S T	P R S G
Criterion:	A	A	A	A	A	A	A
Significant Main Effects:	G**		G**		G**	T**	R* G**
Significant Interaction Effects:			SG* ISG*		CSG*		
Total N[1]:	143	100	96	75	70	125	120
experimental n:	73	75	73	0	0	75	73
control n:	70	25	23	75	70	50	47

*$p<.05$; **$p<.01$.

Factors

U=Group: Experimental (Goodrich); Control
I=Instruction, financial aid received: Special instruction (Goodrich); Regular instruction
C=Control group, financial aid: Assistance received; Assistance not received
P=Programs: Special instruction and financial aid received (Goodrich); Regular instruction and no financial aid received
R=Race: Black; White
S=Sex: Male; Female
T=Gen. Ach./Apt. (test): Below avg.; Avg. and above avg.
G=Grades: Below avg.; Avg. and above avg.

Criterion

A=Attrition: Dropout; Persister

[1] N's varied not only because different subgroups were considered, but because subjects who did not receive any grades had to be eliminated from analyses which included factor G, grades.

persons with below average ACT scores tended to drop out and persons with average and above average ACT scores tended to remain in school. This was what one would expect based on large sample results.[76]

Race, factor R, was able to distinguish dropouts from persisters only once. Therefore, the relationship between race and attrition did not appear to be viable. However, when race did produce a significant effect with attrition, Blacks tended to persist and Whites tended to drop out. Remembering that unweighted means solutions were used, significance of main and interaction effects could be determined on the basis of means of means (namely, noncollapsed cells) or on the basis of overall means (namely, collapsed cells). In this study, means of means were used. Typically, the means of means and the overall means produced the same trends for factors. Interestingly, when the overall means were considered for factor R, there were no apparent significant racial differences with regard to attrition.

Grades (G) contributed strongly to attrition/persistence. Persons with low grades tended to drop out; persons with high grades tended to persist. The research literature was replete with similar findings.[77] Analysis of the SG interaction (Analysis XIV) revealed that G produced a significant effect--G at S_1 (F=21.4661, 1/80 df, $p<.01$). For a discussion of simple effects and criteria see the Data Analysis section, as well as Winer[78] and Kirk.[79] Thus, men with low grades tended to drop out more than men with high grades. Grades also produced significant effects in the ISG and CSG interactions (Analyses XIV and XVI, respectively)--G at I_2S_1 (F=19.081, 1/80 df, $p<.003$) and G at C_1S_1 (F=12.139, 1/54 df, $p<.003$). That is, male, regular instruction, financial aid recipients with lower grades and male, control, financial aid recipients with lower grades tended to drop out more than their higher grade counterparts. Both of these interpretations referred to the same college students placed in different factors (I_2 or C_1). Neither factor I nor factor C produced a significant main effect.

Sex (S), as a simple effect, reached criterion in the ISG interaction in Analysis XIV--S at I_2G_1 (F=10.733, 1/80 df, p .003). That is, male, regular instruction, financial aid recipients with low grades tended to drop out more than their female counterparts.

In summary, the following null hypothesis was negated, namely, that there were no significant differences between the attrition/peristence scores of the experimental group and the control group or the subsets within and between these groups. Grades were potent predictors of attrition/persistence--subjects with below average grades tended to drop out, while subjects with average or above average grades tended to stay in. This relationship was especially pertinent for control men who received financial aid. No strong statements could be made with regard to the remaining relationships.

Attrition: Chi Squares

Chi squares (in this study, 2 by 2, that is, fourfold contingency tables) were used to indicate whether or not significant differences existed with regard to frequency data. One way of interpreting chi square was to consider the proportional differences between columns and rows. If the proportional differences between columns and rows were marked significance resulted. Of course, sample size was very important.

Table 4.9 denotes chi square relationships according to variables for subjects. The rows indicate the variables considered; the columns indicate the subjects (and subsets of subjects) considered. The chi squares in this study were based on the UNO ACT freshman population (maximum number of students = 1,214) and the following subsets (with fewer students):

Table 4.9

Attrition/Persistence: Chi Squares

UNO ACT Freshman Population			Experimental Freshmen			Nonexperimental Freshmen			Nonexperimental Financial Aid Freshmen			Nonexperimental Nonfinancial Aid Freshmen		
	N	p		n	p		n	p		n	p		n	p
U x A	1,214	<.01												
I x A	247	ns												
C x A	1,139	<.01												
P x A	1,042	<.01												
F x A	1,214	<.01												
G x A	1,156	<.01	G x A	73	<.01	G x A	1,083	<.01						
R x A	728	ns	R x A	75	ns	R x A	653	ns						
S x A	1,214	ns	S x A	75	ns	S x A	1,139	ns						
T x A	1,214	<.01	T x A	75	ns	T x A	1,139	<.01	T x A	172	<.01	T x A	967	<.01

Variables

U = Group: Experimental, Nonexperimental (control)

I = Instruction of Financial Aid Recipients: Special (Goodrich), Regular

C = Nonexperimental Group, Financial Aid: Assistance received, Assistance not received

P = Programs, Freshmen: Special Instruction and financial aid received (Goodrich), Regular instruction and no financial received

F = Financial Aid: Assistance received, Assistance not received

G = Grades: Below Average, Average or above average

R = Race: Blacks, Whites

S = Sex: Men, Women

T = Gen.Ach./Apt.: Below Average, Average or above average

A = Attrition: Dropouts, Persisters

experimental freshmen, nonexperimental freshmen, nonexperimental financial aid freshmen, nonexperimental nonfinancial aid freshmen. For example, the U x A chi square (top row of Table 4.9) corresponds to the relationship between group and attrition/persistence for the UNO ACT freshman population.

In Table 4.9, the significances for columns or rows are not necessarily mutually exclusive. The chi squares concerning attrition/persisence revealed several significant trends as indicated in Table 4.9. Group (experimental, nonexperimental), nonexperimental group--financial aid (assistance received, assistance not received), programs (special instruction and financial aid received, regular instruction and no financial aid received) and financial aid (received, not received), separately produced significant results in the only chi squares in which they occurred. Grades (below average, average and above average) produced significant results in three of three chi squares; and general achievement/aptitude (below average, average and above average) produced significant results in four of five chi squares. The focus was upon attrition/persistence as the dependent variable. The significances were determined by two-tailed tests.

For U x A and P x A, the percentage of experimental students who dropped out was significantly smaller than the percentage of nonexperimental students or nonexperimental nonfinancial aid students who dropped out. Somerville[80] and Kelly[81] reported that the attrition rate of special programs compared favorably to the attrition rate of the university.

Considering F x A and C x A, the percentage of dropouts was significantly smaller for persons who received financial aid than for those who did not. That is, freshmen financial aid subjects and nonexperimental financial aid subjects had a greater percentage of persisters than their nonfinancial aid counterparts. Other studies have reported the positive effects of financial aid, namely, that persistence rates are enhanced.[82]

Interestingly, the I x A chi square did not produce significant results. That is, the number of (Goodrich) special instruction, financial aid recipients who dropped out was not significantly different from the number of regular instruction, financial aid recipients who dropped out. It seemed that persistence may have been more closely related to receiving financial aid than to receiving special instruction. In other words, persistence may have been related to finanical aid regardless of the type of instruction received. However, persistence of nonfinancial aid recipients may have been related to the type of instruction they received. This could not be determined in this study since all nonfinancial aid recipients were regular instruction students. One way to consider the relationship between persistence and instruction of nonfinancial aid recipients would be to offer nonfinancial aid students special Goodrich courses.

The relationships between grades and attrition (G x A) indicated that for the designated groups, persons with below average grades tended to drop out and persons with average or above average grades tended to persist. Comparable results were reported by Conner,[83] Ikenberry,[84] and Iffert.[85]

The significant T (general achievement/aptitude) x A (attrition) chi squares revealed that persons with below average ACT scores were about evenly divided between dropping out and persisting; whereas, persons with average or above average ACT scores tended to persist. That is, persons with higher ACT scores were more likely to stay in than persons with lower ACT scores. This was essentially true for all freshmen, for nonexperimental freshmen, for nonexperimental freshmen who received financial aid, and for nonexperimental freshmen who did not receive financial aid. These large sample results mirrored previous research reports.[86] More important was the lack of significant relationship between general achievement/aptitude and attrition/persistence for experimental subjects. In this instance, experimental (namely, Goodrich) subjects, those with below average ACT scores and those with average or above average ACT scores, tended to persist (without significant proportional differences for an n of 75).

In summary, the following null hypothesis was negated, namely, that with regard to attrition/persistence, there were no significant group, instruction, financial aid, race, sex, grade, or general achievement/aptitude differences for subjects in the ACT freshman population, or subsets within this population. Considering large sample statistics, experimental treatment and financial aid appeared conducive to remaining in school. However, lack of treatment or lack of financial aid was not necessarily conducive to dropping out. Generally, grades were a major determinant of attendance--persons with higher grades tended to persist; persons with lower grades tended to drop out. Generally, average or above average general achievement/aptitude was a good indicator of persistence, but below average general achievement/aptitude was not a good indicator of attrition. Experimental (Goodrich) students tended to persist regardless of their ACT scores.

Attrition: Product Moment Correlations

Denoted in Table 4.10 are product moment correlations with attrition (drop out, persist) as the dependent variable. The independent variables (see the rows, Table 4.10) were: group (experimental, control); financial aid (received, not received); general achievement/aptitude (actual ACT Composite scores); race (Black, White); sex (male, female); employment, hours (0, 1-10, 11-20, 21-30, 31+); and grades (below average, average and above average).

Correlations (for subjects, see the columns, Table 4.10) are presented for All subjects and for subjects categorized according to: financial aid (recipient, nonrecipient); general achievement/aptitude

Table 4.10

Attrition/Persistence: Product Moment Correlations

Variables		Subjects				
		All	FinancialAid		Gen.Ach./Apt.(test)	
			R	N	BA	A&AA
U x A:						
tot.	r	-.18*	-.15		-.13	-.18
	n	(150)	(100)		(62)	(88)
F x A:						
tot.	r	-.12			-.17	-.12
	n	(150)			(62)	(88)
con.	r	.04			-.11	.05
	n	(75)			(33)	(42)
Ta x A:						
tot.	r	.17	.23			
	n	(150)	(100)			
exp.	r	.23	.23			
	n	(75)	(75)			
con.	r	.12	.12	.13		
	n	(75)	(25)	(50)		
R x A:						
tot.	r	.10	.10		-.01	-.02
	n	(150)	(100)		(62)	(88)
exp.	r	.03	.03		-.14	-.08
	n	(75)	(75)		(29)	(46)
con.	r	.17	.24	.10	.02	.05
	n	(75)	(25)	(50)	(33)	(42)
S x A:						
tot.	r	.01	-.04		.19	-.09
	n	(150)	(100)		(62)	(88)
exp.	r	-.09	-.09		.13	-.29
	n	(75)	(75)		(29)	(46)
con.	r	.13	.07	.11	.11	.03
	n	(75)	(25)	(50)	(33)	(42)
E x A:						
exp.	r	-.02	-.02		.01	.21
	n	(75)	(75)		(29)	(46)
G x A:						
tot.	r	.74**	.79**		.47**†	.29**
	n	(143)	(96)		(58)	(85)
exp.	r	.79**	.79**		.50**†	.20†
	n	(73)	(73)		(27)	(46)
con.	r	.62**	.60**	.56**	.58**	.47**
	n	(70)	(23)	(47)	(31)	(39)

*p<.05; **p<.01. (two tailed tests)

Subjects

All=all subjects in the specified sample: total; experimental; control

Financial Aid=R(recipients); N(nonrecipients)

Gen.Ach./Apt.(test)=BA(S's w/ below avg. ACT scores); A&AA(S's w/avg. & above avg. ACT scores)

Race=B(Blacks); W(Whites)

Sex=M(males); F(females)

Race & Sex=BM(Black males); BF(Black females); WM(White males); WF(White females)

(Legend continued on next page)

Table 4.10 (continued

		Subjects			
		Race		Sex	
Variables		B	W	M	F
U x A:					
tot.	r	-.26*	-.07	-.32**	-.03
	n	(70)	(80)	(68)	(82)
F x A:					
tot.	r	-.12	-.12	-.22	-.01
	n	(70)	(80)	(68)	(82)
con.	r	.04	-.07	.05	.04
	n	(35)	(40)	(34)	(41)
Ta x A:					
tot.	r	.13	.14	.21	.15
	n	(70)	(80)	(68)	(82)
exp.	r	.22	.37	.41	.09
	n	(35)	(40)	(34)	(41)
con.	r	.02	-.05	.07	.20
	n	(35)	(40)	(34)	(41)
R x A:					
tot.	r			.13	.03
	n			(68)	(82)
exp.	r			.04	-.01
	n			(34)	(41)
con.	r			.14	.14
	n			(34)	(41)
S x A:					
tot.	r	.05	-.01		
	n	(70)	(80)		
exp.	r	-.07	-.16		
	n	(35)	(40)		
con.	r	.10	.09		
	n	(35)	(40)		
E x A:					
exp.	r	.04	.00	-.29	.19
	n	(35)	(40)	(34)	(41)
G x A:					
tot.	r	.61**	.48**†	.74**	.68**
	n	(64)	(79)	(65)	(78)
exp.	r	.47**	.57**†	.44**†	.63**
	n	(33)	(40)	(34)	(39)
con.	r	.55**	.58**	.49**	.62**
	n	(31)	(39)	(31)	(39)

*p<.05; **p<.01. (two tailed te

Variables

A=Attrition: 1(drop out); 2(persist)
U=Group: 1(experimental); 2(control)
F=Financial Aid: 1(received); 2(not received)
Ta=Gen.Ach./Apt.(test): Actual ACT Composite scores
R=Race: 1(Black); 2(White)
S=Sex: 1(male); 2(female)
E=Employment, hours: 1(0); 2(1-10); 3(11-20); 4(21-30); 5(31+)

r(product
n(sa
tot. r=co
samp
exp. r=co
samp
con. r=co
samp
† indicat
sumptions
to a Pear
termined

(below average, average and above average); race (Black, White); sex (male, female); race and sex (Black male, Black female, White male, White female).

The total r's, experimental r's, and control r's are listed consecutively for each set of variables. The total r refers to the correlation based on the entire sample of college subjects comprising a category; the experimental r refers to the correlation based on the experimental subjects comprising a category; the control r refers to the correlation based on the control subjects comprising a category.

The sample size for each correlation is listed directly below the coefficient. For example, consider the first column of Table 4.10 headed All subjects. The correlation between group and attrition for All subjects was -.18, based on 150 subjects. The correlations between financial aid and attrition for 1) All subjects was -.12, based on 150 subjects; 2) All control subjects was .04, based on 75 control subjects. And so forth.

Some variables did not have total r's, experimental r's, or control r's. For example, when considering U x A only a total r could be used because experimental subjects alone or control subjects alone could not be discriminated on the basis of U (group). The same was true for F x A with regard to experimental r's. All experimental subjects received financial aid, so F could not discriminate experimental subjects. The data for hours of employment were not available for control subjects. Consequently, E was only pertinent for experimental subjects.

Correlations indicated the degree of relationship between two variables. Another way of interpreting r was r^2, sometimes called the coefficient of determination.[87] When multiplied by 100, r^2 indicated the percentage of variance in one variable accounted for by the variance in the other variable. For example, the r of -.18 between U (group) and A (attrition) for All subjects (see Table 4.10, top row) indicated that group accounted for about 3 percent of the attrition variance.

When variables representing continuous data were grouped into a small number of classes the obtained correlations were lowered somewhat.[88] In order to obtain a more realistic estimate of correlation, corrections for coarse grouping were performed.[89] Unlike a Pearson correlation corrected for coarse grouping, a phi corrected for coarse grouping was no longer a phi, per se. Rather it was an estimate of a point biserial correlation or an estimate of a Pearson correlation, depending on whether one or two variables were assumed continuous. Included in Appendix A are the designations of obtained and corrected correlations. Included in Appendix D are the uncorrected correlations, whereas, included in Table 4.10 are the final correlations (some of which required correction, and some of which did not). A few of the phi correlations (see G x A) could not be corrected to an estimated Pearson, since they did not meet the underlying assumptions. (They were denoted by †.)

Firstly, interpretations of the correlation data (presented in Table 4.10) concentrated on the relationships for variables (rows) as they related to subjects. Secondly, data interpretations focused on the relationships for subjects (columns) as they related to variables.

It should be noted that total r samples included experimental subjects and control subjects. That is, the total r's were not independent of the experimental r's and the control r's. Thus, when considering all three r's (total, experimental, and control) for the same variables (rows) and the same subjects (columns), there was confounding. There was also some duplication. Since all experimental subjects were financial aid recipients, the correlations pertaining to all experimental subjects (Table 4.10 see exp. r for All subjects) were the same as the correlations pertaining to experimental financial aid recipients (Table 4.10, see exp. r for Financial aid recipients). For example, consider the Ta x A relationship for All subjects and for Financial aid recipients (Table 4.10, columns one and two). The experimental r for All subjects was .23, based on 75 subjects; the experimental r for Financial aid recipients was also .23, based on the same 75 subjects and the same data.

Despite the tabular limitations mentioned above (some confounding and duplication), trends were discerned. Significant correlations occurred between attrition/persistence (A) and 1) group (U), three out of twelve times; and 2) grades (G), thirty-three out of thirty-seven times.

Generally, in relating U and A (group and attrition), persons in the experimental group were more likely to persist than were persons in the control group (note the number of negative correlations versus one zero correlation). The U and A correlations were significant for 1) all subjects; 2) Blacks; and 3) men. Denmark, Shirk, and Hirsch reported similar findings.[90]

Grades (G) were very closely related to attrition/persistence, with many, many positive significant correlations. Persons with average or above average grades were more likely to remain in school; conversely, persons with below average grades were more likely to drop out of school. These results were in keeping with the majority of findings reported in the literature.[91]

The remaining variables--F (financial aid), Ta (general achievement/aptitude), R (race), S (sex), and E (employment)--manifested no significant relationships with A (attrition/persistence). That is, there were no significant correlations for the sample sizes reported.

Considering the relationships for subjects (columns) as related to variables, major trends were noted. Generally, the pattern (of significant or nonsignificant correlations) was marked and very similar for each column (namely, for each set or subset of subjects). In other words, for subjects the primary significant relationship was between higher grades and persistence, lower grades and attrition. For subjects there was no significant relationship between attrition or persistence and financial aid, ACT, race, sex, or employment. However, for all subjects, for Blacks, and for males, being in the experimental group was moderately related to staying in school.

In summary, the following null hypothesis was negated, namely, that there were no correlational relationships which were significantly different from zero between attrition/persistence and financial aid, general achievement/aptitude, race, sex, or grades for the experimental group, control group, or subsets within and between these groups. The correlational trends implied that grades were very closely associated with attrition/persistence--higher grades with staying in college, and lower grades with leaving college. Variables financial aid, ACT Composite scores, race, sex, and employment had no significant correlations with attrition/persistence. The Goodrich, experimental program was moderately associated with persistence for all subjects, for Blacks, and for males.

Attrition: Multiple Predictions

Multiple correlations were determined for the same groups or subgroups of college students that were considered for the single correlations. However, multiple predictors of attrition/persistence were considered in two ways. Firstly, regression equations were developed to predict attrition/persistence of incoming (new) freshmen when college grades (G) could not be considered a predictor variable. Secondly, regression equations were developed to predict the attrition/persistence of freshmen when college grades (G) could be considered a predictor variable. The

Table 4.11

Attrition/Persistence: Multiple Predictions, Grades Not a Factor

Subjects	n	R	SE	Regression Equation	Correlation w/ Add. Variables				cR[1]	cSE[1]
					r	Rw/2	Rw/3	Rw/4		
All	150	.25*	.46	1.70 - .17U + .01Ta+ .02S - .03R	.18	.25	.25	.25	.19	.47
Males	68	.31*	.46	1.72 - .22F + .02Ta	.22	.31	R†		.26	.48
Males	68	.37*	.45	1.86 - .30U + .01Ta+ .03R	.32	.37	.37		.32	.46
Black Males	32	.45*	.46	1.49 + .04Ta- .28U	.35	.45			.38	.48
Exp. Males	34	.67**	.32	1.70 + .06Ta- .48R - .14E	.41	.54	.67		.63**	.33
Exp. Black Males	16	.62*	.38	.93 + .06Ta+ .04E	.61	.62			.54	.41

*p<.05; **p<.01. (two tailed tests)

† indicates variable was not included in the regression equation because it was insufficient to add to the multiple R.

Variables

U = Group: 1(experimental); 2(control)
Ta= Gen. Ach./Apt. (test): Actual ACT Composite Scores
S = Sex: 1(male); 2(female)
R = Race: 1(Black); 2(White)
F = Financial Aid: 1(received); 2 (not received)
E = Employment, hours: 1(0); 2(1-10); 3(11-20); 4(21-30); 5(31+)

[1] J. P. Guilford & B. Fruchter, Fundamental Statistics in Psychology and Education (New York: McGraw Hill, 1973), pp. 366-367.

nonsignificant multiple correlations were not shown in this study. The variables and sample sizes; significant multiple correlations and their standard errors, uncorrected and corrected; regression equations; and stepwise correlations were listed in Tables 4.11 and 4.12. Table 4.11 considered the prediction of attrition/persistence when grades were not a factor. Table 4.12 considered the prediction of attrition/persistence when grades were a factor. All decimal terms were rounded off to hundredths.

Multiple regression included optimal weights for predictors of criterion (for example, attrition/persistence). Multiple predictors can also be interpreted in terms of R^2, often referred to as the coefficient of multiple determination.[92] When multiplied by 100, R^2 indicated the percentage of variance accounted for in the dependent variable by the variance in the predictor variables, taken collectively. For example, in the top row of Table 4.11, the cR of .19 for all subjects indicated that about 4 percent of the attrition/persistence variance was accounted for by the predictor variables of U (group), Ta (general achievement/aptitude), S (sex), and R (race).

Corrections for R's (resulting in cR's) and for SE's (resulting in cSE's) were required because of the relatively large number of predictor variables employed with small samples.[93] Uncorrected, the R's tended to be larger and the SE's tended to be smaller.

The column labeled "r" lists the highest single correlation with attrition/persistence for the subjects in question. The remaining columns--Rw/2, Rw/3, Rw/4--list the multiple R's obtained with the addition of each new variable in the stepwise regression procedure. In other words, the correlation r relates to the first (letter) variable in the regression equation; the correlation Rw/2 relates to the first two (letter) variables; and so forth. That is, Rw/2 means multiple correlation with two variables (the first two letter variables which contributed most to the coefficient). "Stepwise" referred to the addition of the most influential variables, in order. For example, considering All subjects (Table 4.11, top row) group (U) correlated with attrition/persistence .18; group (U) and general achievement/aptitude (Ta) correlated with attrition/persistence .25, and so forth.

In some instances, variables considered for the stepwise regression proved to be insufficient for inclusion in the equation. That is, the F level or the tolerance level for the variable was insufficient to warrant further computation. If the F level was too small, it meant that the variable was not worth adding for it contributed so little. If the tolerance level was too small, it meant that the variable was nearly a linear expression of the variables already in the equation. Variables which were not incorporated into an equation are denoted by the superscript †. For example, the regression equation for males (second row of Table 4.11) did not include race (R) as a predictor variable because additional computation was unwarranted.

In several cases, addition of a variable into the regression equation did not increase the coefficient enough to change the tenths or hundredths place of the R. For example, considering men (row three of Table 4.11), the multiple correlation of group (U) and general achievement/aptitude (Ta) was .37; the multiple correlation of group (U), general achievement/aptitude (Ta), and race (R) was also .37. That is, the addition of race (R) did not increase the correlation coefficient when rounding to hundredths.

Variables U (group: experimental, control) and F (financial aid: assistance received, assistance not received) were confounded. That is, they were not independent of each other. Being in the experimental group automatically meant that a student received financial aid. To avoid confounded variables in the same regression equation, separate equations were computed--one which included U and excluded F; one which included F and excluded U. For example, note the second and third equations in Table 4.11 referring to males. The first equation included variables F (financial aid), Ta (general achievement/aptitude), and R (race); the second equation considered the same variables except that U (group) was included instead of F (financial aid).

There was also the problem of exclusion, pertaining to variable E (employment, hours). That is, all control subjects were excluded from the five categories of hours employed (because the data were not available for these subjects). Consequently, hours of employment could not be a predictor variable for groups of subjects which included control subjects. Only multiple predictors which pertained specifically to experimental subjects included variable E. For example, the regression equations for males (rows two and three of Table 4.11) did not include variable E. However, the regression equation for experimental males (row five of Table 4.11) did include variable E.

The rows, that is, the separate multiple correlations were not necessarily independent of each other. But in cumulating the results, trends were important. There were 150 subjects in various groups or subgroups, when grades were not a variable; there were 143 subjects in various groups or subgroups, when grades were a variable.

The prediction of attrition/persistence when grades were not a factor (see Table 4.11) revealed that only six multiple R's were significant initially. Correction of the R's reduced the number of significant multiple predictors to one. That is, attrition/persistence could be significantly predicted for experimental men (row five of Table 4.11) with approximately 40 percent of the attrition/persistence variance accounted for.

In this instance, ACT scores accounted for the plurality of attrition/persistence variance, about 17 percent. However, the addition of race and employment as predictor variables added appreciably to the correlations. Thus, the prediction of attrition/persistence for incoming freshmen, using the variables of group or financial aid, general achievement/aptitude, race, sex, and employment, was problematic at best.

The prediction of attrition/persistence when grades were a factor (see Table 4.12) produced forty significant multiple R's initially. Correction of the R's reduced the number of significant multiple predictors to thirty-three.

G (grades) was the first variable in all thirty-three signficant multiple cR's. In twenty-four of the thirty-three predictors there appeared to be no significant difference between grades as a single predictor and grades as part of a multiple predictor of attrition/persistence. For example, in the first row of Table 4.12, the r between G and A (attrition/persistence) was .74 and accounted for approximately 55 percent of the attrition/persistence variance; the cR for attrition was .77 and accounted for approximately 59 percent of the attrition/persistence variance. Grades were the prime predictors of attrition/persistence. And, generally, grades alone were adequate for significant prediction. Research findings have shown that college grades point average is a major determinant of attrition/persistence.[94]

Other trends, for subjects or factors, were noted. Generally, in terms of attrition/persistence, experimental subjects were more predictable than control subjects; financial aid subjects were more predictable than nonfinancial aid subjects; Blacks were more predictable than Whites; and subjects with below average ACT scores were more predictable than subjects with average or above average ACT scores. In other words,

Table 4.12

Attrition/Persistence: Multiple Predictions, Grades a Factor

Subjects	n	R	SE	Regression Equation	Correlation w/ Add. Variables r	Rw/2	Rw/3	Rw/4	Rw/5	cR[1]	cSE[1]
All	143	.78**	.29	.79 + .82G - .16R - .01Ta- .05S + .03F	.74	.77	.77	.78	.78	.77**	.30
All	143	.78**	.29	.81 + .81G - .16R - .01Ta- .06S + .01U	.74	.77	.77	.78	.78	.77**	.30
Exp.	73	.89**	.20	.52 + .97G - .02Ta- .10E + .06S - .07R	.79	.85	.89	.89	.89	.88**	.21
Con.	70	.64**	.39	.83 + .66G - .01Ta- .07R - .03S + .03F	.62	.63	.64	.64	.64	.60**	.40
Fin. Aid Rec.	96	.84**	.25	.68 + .82G - .30R + .01Ta+ .02S	.79	.83	.84	.84	U†	.83**	.25
No Fin. Aid Rec.	47	.59**	.41	1.04 + .63G - .12R - .07S - .00Ta	.56	.58	.58	.59		.53**	.43
Blacks	64	.62**	.37	.68 + .56G + .01Ta	.61	.62	F†	S†		.61**	.38
Blacks	64	.63**	.37	.87 + .53G + .01Ta- .10U	.61	.62	.63	S†		.60**	.38
Whites	79	.50**	.40	1.03 + .59G - .11S - .01Ta+ .02F	.48	.49	.50	.50		.46**	.41
Whites	79	.50**	.40	1.00 + .59G - .11S - .01Ta+ .04U	.48	.49	.50	.50		.46**	.41
Males	65	.74**	.32	.53 + .72G + .05F - .03R - .00Ta	.74	.74	.74	.74		.72**	.33
Males	65	.74**	.32	.66 + .69G - .03R - .02U	.74	.74	.74	Ta†		.72**	.33
Females	78	.78**	.29	.71 + .90G - .03Ta- .12R + .07F	.68	.77	.78	.78		.77**	.30
Females	78	.78**	.29	.77 + .90G - .03Ta- .11R + .01U	.68	.77	.78	.78		.76**	.30
S's BA ACT	58	.56**	.43	.62 + .45G + .24S - .14F + .09R	.47	.54	.55	.56		.51**	.44
S's BA ACT	58	.55**	.43	.52 + .46G + .26S - .08U + .10R	.47	.54	.54	.55		.50**	.45

(Legend on last page of Table)

Table 4.12 (continued)

Subjects	n	R	SE	Regression Equation	Correlation w/ Add. Variables				cR[1]	cSE[1]
					r Rw/2Rw/3Rw/4Rw/5					
S's A & AA ACT	85	.44**	.38	1.64 + .43G - .25R - .19S + .09F	.29	.37	.43	.44	.39**	.39
S's A & AA ACT	85	.43**	.38	1.71 + .42G - .24R - .19S + .04U	.29	.37	.43	.43	.38**	.39
Black Males	30	.75**	.34	.08 + .62G + .05Ta+ .04F	.67	.75	.75		.72**	.36
Black Males	30	.75**	.34	.22 + .61G + .05Ta- .04U	.67	.75	.75		.72**	.36
Black Females	34	.69**	.34	.38 + .47G + .47U - .00Ta	.45	.69	.69		.65**	.37
White Males	35	.71**	.33	.69 + .77G - .02Ta+ .11F	.67	.70	.71		.68**	.34
Whites Males	35	.71**	.33	.80 + .74G - .02Ta+ .05U	.67	.70	.71		.67**	.34
White Females	44	.55**	.40	.61 + .77G - .02Ta+ .02F	.53	.55	.55		.50**	.41
White Females	44	.55**	.40	.73 + .80G - .02Ta- .07U	.53	.55	.55		.51**	.41
Con. Fin. Aid Rec.	23	.61*	.41	.64 + .60G + .08S - .00Ta	.60	.61	.61	$R^{\dagger}$	.52	.45
Exp. Blacks	33	.54*	.37	1.14 + .42G - .08E + .01Ta- .03S	.47	.53	.54	.54	.45	.40
Exp. Whites	40	.59**	.37	.70 + .71G - .05E - .07S - .00Ta	.57	.59	.59	.59	.53*	.39
Con. Blacks	31	.60*	.43	.14 + .60G + .04Ta+ .11S + .02F	.55	.59	.60	.60	.51	.46
Con. Whites	39	.67**	.37	.94 + .78G - .03Ta- .23S + .16F	.58	.62	.66	.67	.62**	.39
Exp. Men	34	.65**	.33	1.39 + .19G - .10E + .04Ta- .34R	.44	.52	.58	.65	.58*	.36
Exp. Women	39	.79**	.29	.67 + .99G - .04Ta- .09E + .04R	.63	.76	.79	.79	.76**	.30
Con. Women	39	.70**	.35	.80 + .78G - .29R + .12F - .01Ta	.62	.68	.69	.70	.65**	.38

(Legend on last page of Table)

Table 4.12 (continued)

Subjects	n	R	SE	Regression Equation	Correlation w/ Add. Variables r	Rw/2	Rw/3	Rw/4	Rw/5	cR[1]	cSE[1]
Exp. S's BA ACT	27	.65*	.40	.72 + .56G + .27S - .09E - .21R	.50	.57	.62	.65		.56	.43
Con. S's BA ACT	31	.62**	.42	.73 + .57G - .19F + .18S	.58	.60	.62	R†		.57*	.44
Con. S's A & AA ACT	39	.51*	.40	1.40 + .56G - .20R - .14S	.47	.49	.51	F†		.45*	.41
Exp. Black Males	16	.70*	.35	.51 + .06Ta+ .31G + .03E	.61	.70	.70			.61	.40
Exp. White Males	18	.86**	.22	.49 +1.37G + .25E - .08Ta	.60	.71	.86			.82**	.24
Con. Black Males	14	.78*	.47	-.32 + .79G + .04Ta+ .19F	.72	.76	.78			.69	.43
Con. Black Females	17	.66*	.41	.14 + .65G + .04Ta+ .09F	.60	.66	.66			.56	.45

$*p<.05$; $**p<.01$. (two tailed tests)

† indicates variable was not included in the regression equation because it was insufficient to add to the multiple R.

Variables

G = Grades: 1(below avg.); 2(avg. & above avg.)
R = Race: 1(Black); 2(White)
Ta= Gen. Ach./Apt. (test): Actual ACT Composite scores
S = Sex: 1(male); 2(female)
F = Financial Aid: 1(received); 2(not received)
U = Group: 1(experimental); 2(control)
E = Employment, hours: 1(0); 2(1-10); 3(11-20); 4(21-30); 5(31+)

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[1] J. P. Guilford & B. Fruchter, Fundamental Statistics in Psychology and Education (New York: McGraw Hill, 1973), pp. 366-367.

the former multiple correlations appeared higher than the latter multiple correlations.

Other differentiations could also be made: Black men were more predictable than Black women; White men were more predictable than White women; experimental women were more predictable than experimental men; experimental White men were more predictable than experimental Black men; and so forth. Consulting Table 4.12 can help to differentiate cohort subgroups.

Interestingly, dyadic and triadic combinations of the above factors (subjects) did not necessarily manifest higher R's or cR's. Stated differently, going from a single factor to a double factor to a triple factor did not necessarily increase the multiple correlations.

In predicting attrition/persistence, the cR's for all subjects (top two rows of Table 4.12) were .77 , the range of significant correlations was from .38 to .88. Thus, it was apparent that considering various groups and subgroups was more efficacious than arbitrarily considering all subjects together. Some groups and subgroups were less predictable than others and using the same equation (developed for all students) with these subjects produced misleading results. Conversely, some groups and and subgroups were more predictable than others and so forth. Thus, more accurate results were obtained with separate regression equations for groups and subgroups.

To test the efficiency of the regression equations with large samples, obtained attrition/persistence scores (1-dropout, 2-persister) were compared with predicted attrition/persistence scores (developed from the regression equations) for all subjects and for financial aid subjects. Arbitrarily using the median of the predicted attrition scores as the cut off point (that is, scores below the median were designated dropouts,

scores equal to or above the median were designa
tions for all subjects were accurate approximate
(using either multiple regression equation , top
That is, approximately 70 percent of the predict
sponded to the obtained scores. Considering the
about 83 percent of the subjects who actually dr
dropouts according to their predicted scores; ab
jects who actually persisted were designated per
to their predicted scores. Analogously, using t
attrition/persistence scores as the cut off poin
cial aid subjects were accurate approximately 63
about 75 percent of the subjects who actually dr
dropouts according to their predicted scores; ab
jects who actally persisted were designated pers

It should be noted that cut off points c
to maximize predictive efficiency--for overall a
attrition, or for persistence. Using the median
and popular. But, in the instances above (for t
persistence),choosing a cut off below the median
increased the overall and persister accuracy per
dents dropped out, especially in the financial a

In summary, the following null hypothesis
there were no significant multiple predictors of
subjects in the experimental and control sample,
ple. College grades accounted for the greatest a
ence variance for most subjects (groups and subgr
tion/persistence was adequately predicted for the
subgroups using college grades alone. That is, c

predictors often did not appear necessary. Generally, the following groups were more predictable than their cohorts: experimental; financial aid recipients; Black; or academically deficient (that is, those with below average ACT scores). Many subgroups were also differentiated as being more predictable or less predictable. Consequently, separate regression equations developed for groups and subgroups produced more accurate results. The overall accuracy of the regression equations in the prediction of attrition/persistence for persons in the largest sample was about 70 percent (using a median cut off technique). With the exception of experimental men, the attrition/persistence of incoming freshmen could not be predicted well. That is, usually when college grades were not available, attrition/persistence could not be predicted adequately.

NOTES AND REFERENCES

[1] J. W. Hall, "The Effects of Supportive Services for Disadvantaged College Students," Dissertation Abstracts International, 32 (7-A): 3686-3687, Jan., 1972.

[2] D. R. Green, "Racial and Ethnic Bias in Test Construction. Final Report" (Monterey: CTB/McGraw Hill, Sept., 1971), (Washington, D. C.: ERIC Clearinghouse on Tests, Measurement, and Evaluation, Feb., 1972).

[3] F. E. Crossland, Minority Access to College, A Ford Foundation Report (New York: Schocken, 1971).

[4] F. Bowles and F. A. DeCosta, Between Two Worlds (New York: McGraw Hill, 1971).

[5] S. C. Davis, J. W. Loeb, and L. F. Robinson, "A Comparison of Characteristics of Negro and White College Freshmen Classmates," Journal of Negro Education, 39:359-366, Fall, 1970.

[6] N. S. Cole, Differential Validity of the ACT Tests, ACT Research Report, No. 30 (Iowa City: American College Testing Program, 1969).

[7] J. W. Loeb and D. J. Mueller, "The Use of a Scale of High Schools in Predicting College Grades," Educational and Psychological Measurement, 30:381-386, Summer, 1970.

[8] R. E. Spencer and W. M. Stallings, "The Student Profile Section of the ACT Related to Academic Success," Journal of College Student Personnel, 9:177-179, May, 1968.

[9] B. J. Winer, Statistical Principles in Experimental Design (2d ed.; New York: McGraw Hill, 1971), pp. 445-449.

[10] R. E. Kirk, Experimental Design: Procedures for the Behavioral Sciences (Belmont: Brooks/Cole, 1968), pp. 179-182.

[11] Ibid.

[12] J. H. Borup, "The Validity of the American College Test for Discerning Potential Academic Achievement Levels: Ethnic and Sex Groups," Journal of Educational Research, 65:3-6, Sept., 1971.

[13] See the ACT: Analyses of Variance section in this chapter; see also Hall, loc. cit.; see also Green, loc cit.; see also Crossland, loc. cit.; see also Bowles and DeCosta, loc. cit.

[14] Commission on Tests, Report of the Commission on Tests: I. Righting the Balance (New York: College Entrance Examination Board, 1970); see also R. R. DeBlassie and K. Boswell, "The Culturally Disadvantaged College Student," Journal of the National Association of Women Deans and Counselors, 35:126-132, Spring, 1972; see also Bowles and DeCosta, loc. cit.

[15] R. Merritt, "Academic Performance of Work-Study Students," Journal of College Student Personnel, 11:173-176, May, 1970.

[16] L. L. Baird, Family Income and the Characteristics of College Bound Students, ACT Research Reports, No. 17 (Iowa City: American College Testing Program, Feb., 1967).

[17] R. L. Flaugher, "Testing Practices, Minority Groups, and Higher Education: A Review and Discussion of the Research" (Princeton: Educational Testing Service), (Washington, D. C.: ERIC Clearinghouse on Tests, Measurement, and Evaluation, June, 1970); see also R. E. Pandey, "The SCAT and Race," Psychological Reports, 28 (2):459-462, April, 1971; see also Davis, Loeb, and Robinson, loc. cit.; see also Crossland, loc. cit.

[18] Bowles and DeCosta, loc. cit.; see also DeBlassie and Boswell, loc. cit.

[19] F. L. Denmark, E. J. Shirk, and V. U. Hirsch, "Determinants of Success in a College Preparatory Program for Disadvantaged High School Graduates" (paper read at Eastern Psychological Association, Washington, April, 1968); see also J. Bowers, "The Evaluation of a Special Educational Opportunities Program for Disadvantaged College Students. Final Report" (Illinois University, Urbana, Office of Education, DHEW, Washington, D. C.: Bureau of Research), (Washington, D. C.: ERIC Clearinghouse on Higher Education, June, 1971).

[20] B. B. Baber, Jr. and R. B. Caple, "Educational Opportunity Grant Students: Persisters and Nonpersisters," Journal of College Student Personnel, 11:115-119, March, 1970.

[21] D. Trapp, K. Pailthorp, and R. Cope, "Entrance Characteristics and Their Relationship to Types of Student Dropouts," Institutional Research and Institutional Policy Formulation: 11th Annual Forum of the Association for Institutional Research 1971 (Claremont: Office of Institutional Research, Dec., 1971), pp. 119-122.

[22] J. P. Guilford and B. Fruchter, Fundamental Statistics in Psychology and Education (5th ed.; New York: McGraw Hill, 1973), p. 348.

[23] Ibid., p. 322.

[24] Ibid., see also C. C. Peters and W. R. VanVoorhis, Statistical Procedures and their Mathematical Bases (New York: McGraw Hill, 1940), p. 398.

[25] See the ACT: Analyses of Variance and Chi Square sections of this chapter; see also Davis, Loeb, and Robinson, loc. cit.

[26] Crossland, loc. cit.; see also Green, loc. cit.

[27] Cole, loc. cit.; see also Commission on Tests, loc. cit.; see also Loeb and Mueller, loc. cit.

[28] Denmark, Shirk, and Hirsch, loc. cit.

[29] Bowers, loc. cit.

[30] D. G. Wells and B. Fruchter, "Correcting the Correlation Coefficient for Explicit Restriction on Both Variables," Educational and Psychological Measurement, 30:925-934, 1970; see also D. G. Wells and D. T. Pedrini, "Relationship Between the Stanford Binet L-M and the Goodenough D-A-M," Psychology in the Schools, 4:371-375, 1967; see also D. T. Pedrini and B. C. Pedrini, "Reading Abilities and College Grades," in press.

[31] O. R. Hendrix, "The Effect of Special Advising on Achievement of Freshmen with Low Predicted Grades," Personnel and Guidance Journal, 44: 185-188, Oct., 1965.

[32] B. Somerville, "Minorities and Higher Education (paper read at Western College Association, San Diego, March, 1967).

[33] W. F. Brown, N. O. Wehe, V. G. Zunker, and W. L. Haslam, "Effectiveness of Student-to-Student Counseling on the Academic Adjustment of Potential College Dropouts," Journal of Educational Psychology, 62:285-289, Aug., 1971.

[34] J. Aiken, "A Comparison of Junior College Withdrawees" (Washington, D. C.: ERIC Clearinghouse on Junior Colleges, 1968).

[35] W. C. Blanchfield, "College Dropout Identification: A Case Study," Journal of Experimental Education, 40:1-4, Winter, 1971.

[36] J. D. Conner, "The Relationship Between College Environmental Press and Freshmen Attrition at Southern Methodist University," College and University, 43:265-273, Spring, 1968.

[37] Baber and Caple, loc. cit.

[38] R. J. Cope, "Limitations of Attrition Rates and Causes Given for Dropping Out of College," Journal of College Student Personnel, 9:386-392, Nov., 1968.

[39] P. W. Hoffman, "A Comparative Study of Student Retention and Attrition at Manchester College," Dissertation Abstracts International, 32 (2-A):738, Aug., 1971.

[40] Cole, loc. cit.; see also Loeb and Mueller, loc. cit.; see also Commission on Tests, loc. cit.

[41] Winer, loc. cit.

[42] Kirk, loc. cit.

[43] Pandey, loc. cit.

[44] Davis, Loeb, and Robinson, loc. cit.

[45] D. D. Sampel and W. R. Seymour, "The Academic Success of Black Students: A Dilemma," Journal of College Student Personnel, 12:243-247, July, 1971.

[46] Hendrix, loc. cit.

[47] Somerville, loc. cit.

[48] Brown, et al., loc. cit.

[49] J. M. Foster and D. D. Jenkins, *KSU Freshmen, 1960-1964 Potential Ability (ACT) and Obtained Grades*, Studies in Student Personnel Work Research Reports, No. 30 (Kansas State University, Student Counseling Center, Dec., 1965); see also A. R. Baron, "Non-intellective Variables Related to Successful and Unsuccessful Students in a Junior College" (unpublished report, 1968), (*College Student Personnel Abstracts*, 5:1-2, Fall, 1969); see also D. J. Veldman, "Effects of Sex, Aptitudes, and Attitudes on the Academic Achievement of College Freshmen," *Journal of Educational Measurement*, 5:245-249, Fall, 1968.

[50] Spencer and Stallings, loc. cit.; see also Cole, loc. cit.; see also Loeb and Mueller, loc. cit.

[51] J. C. Stanley and A. C. Porter, "Correlation of Scholastic Aptitude Test Scores with College Grades for Negroes Versus Whites," *Journal of Educational Measurement*, 4:199-217, Winter, 1967; see also J. Egerton, "High Risk: Five Looks," *Southern Education Report*, 3:25-36, April, 1968, see also L. R. Beach, *Identifying the Potentially Successful Among Marginal College Entrants. Final Report* (Office of Education, DHEW, Washington, D. C., Bureau of Research, Aug., 1968).

[52] Guilford and Fruchter, op. cit., p. 348.

[53] Ibid., p. 322.

[54] Ibid., pp. 322-324; see also J. P. Guilford and N. C. Perry, "Estimation of Other Coefficients of Correlation From the Phi Coefficient," *Psychometrika*, 16:335-346, Sept., 1951; see also W. B. Michael, N. C. Perry, and J. P. Guilford, "The Estimation of a Point Biserial Coefficient of Correlation from a Phi Coefficient," *British Journal of Psychology, Statistical Section*, 5:130-150, Nov., 1952.

[55] C. J. Jensema and C. E. Lunneborg, *A Preliminary Investigation of a Special Education Program for Minority Group University Students* (University of Washington, Bureau of Testing, June, 1970); see also Hendrix, loc.cit.; see also Brown, et al., loc. cit.

[56] Cole, loc. cit.; see also Loeb and Mueller, loc. cit.; see also Commission on Tests, loc. cit.

[57] Wells and Fruchter, loc. cit.; see also Wells and Pedrini, loc. cit.; see also Pedrini and Pedrini, loc. cit.

[58] Pandey, loc. cit.

[59] Stanley and Porter, loc. cit.

[60] Baron, loc. cit.

[61] Veldman, loc. cit.

[62] Foster and Jenkins, loc. cit.

[63] Baron, loc. cit.

[64] Jensema and Lunneborg, loc. cit.; see also Brown, et al., loc. cit.; see also Egerton, loc. cit.

[65] Guilford and Fruchter, op. cit., p. 365.

[66] Ibid., pp. 366-367.

[67] Commission on Tests, loc. cit.; see also Cole, loc. cit.; see also Loeb and Mueller, loc. cit.

[68] K. B. Clark and L. Plotkin, *The Negro Student at Integrated Colleges* (New York: National Scholarship and Fund for Negro Students, 1963).

[69] Wells and Fruchter, loc. cit.; see also Wells and Pedrini, loc. cit.; see also Pedrini and Pedrini, loc. cit.

[70] D. W. Irvine, "Estimated Grades and Freshmen Achievement," *Vocational Guidance Quarterly*, 13:193-195, March, 1965.

[71] C. A. Lindsay and R. Althouse, *Comparative Validities of the Strong Vocational Interest Blank Academic Scale and the College Student Questionnaire Motivation for Grades Scale*, Student Affairs Research Report, No. 68-2 (University Park: Office of Student Affairs, Pennsylvania State University, June, 1968).

[72] J. C. Stanley, "Further Evidence Via the Analysis of Variance that Women are More Predictable Academically than Men," *Ontario Journal of Educational Research*, 10:49-56, Jan., 1967.

[73] W. B. Michael, R. A. Jones, A. Coe, A. Gershon, M. Hoover, K. Katz, and D. Smith, "High School Record and College Board Scores as Predictors of Success in a Liberal Arts Program During the Freshman Year of College," *Educational and Psychological Measurement*, 22:399-400, Feb., 1962.

[74] Denmark, Shirk, and Hirsch, loc. cit.; see also Bowers, loc. cit.

[75] R. G. Kinney, "The Effect of Scholarship Aid Upon the Academic Achievement and Persistence of Washington State University Undergraduates," *Dissertation Abstracts International*, 31 (8-A):3903-A, Feb., 1971.

[76] A. W. Astin, *College Dropouts: A National Profile*, ACE Research Reports, Vol. 7, No. 1 (American Council on Education, Feb., 1972); see also Trapp, Pailthorp, and Cope, loc. cit.

[77] Conner, loc. cit.; see also Cope, loc. cit.; see also W. G. Spady, "Peer Integration and Academic Success: Toward a Sociological Model of Undergraduate Attrition" (paper read at American Educational Research Association, Chicago, Feb., 1968); see also S. Ikenberry,

"Factors in College Persistence," Journal of Counseling Psychology, 8:322-329, Winter, 1961; see also R. E. Iffert, Retention and Withdrawal of College Students (Washington, D. C.: U. S. Office of Education, Government Printing Office, 1958).

[78] Winer, loc. cit.

[79] Kirk, loc. cit.

[80] B. Somerville, "Can Selective Colleges Accomodate the Disadvantaged? Berkeley Says 'Yes'," College Board Review, 65:5-10, Fall, 1967.

[81] R. K. Kelly, "An Experimental Work-Study Program for Disadvantaged Youth," Educational Record, 49:214-220, Spring, 1968.

[82] H. S. Astin, A. W. Astin, A. S. Bisconte, and H. H. Frankel, Higher Education and the Disadvantaged Student (Washington, D. C.: Human Services Press, 1972); see also H. E. Yuker, P. Lichtenstein, and P. Witheiler, Who Leaves Hofstra for What Reason, Research Report No. 102 (Hofstra University: Center for the Study of Higher Education, May, 1972).

[83] Conner, loc. cit.

[84] Ikenberry, loc. cit.

[85] Iffert, loc. cit.

[86] Astin, loc. cit.; see also Trapp, Pailthorp, and Cope, loc. cit.

[87] Guilford and Fruchter, op. cit., p. 348.

[88] Ibid., p. 322.

[89] Ibid., pp. 322-324; see also Guilford and Perry, loc. cit.; see also Michael, Perry, and Guilford, loc. cit.

[90] Denmark, Shirk, and Hirsch, loc. cit.

[91] Cope, loc. cit.; see also Iffert, loc. cit.; see also Ikenberry, loc. cit.

[92] Guilford and Fruchter, op. cit., p. 365.

[93] Ibid., pp. 366-367.

[94] Aiken, loc. cit.; see also W. G. Spady, "Dropouts from Higher Education: Toward an Empirical Model," Interchange, 2:58-62, No. 3, 1971; see also P. Sensor, "Follow-up of 1965 Freshmen Who Did Not Return for Fall Semester 1966" (Riverside City College, California, May, 1967), (Washington, D. C.: ERIC Clearinghouse on Junior Colleges, 1967); see also R. J. Morrisey, "Attrition in Probationary Freshmen," Journal of College Student Personnel, 12:279-285, July, 1971.

SUMMARY AND CONCLUSIONS

This final chapter includes several distinct sections. Initially, there is a general review of the professional research literature. The purposes of this study are then stated. Summary and conclusions are given for ACT Composite scores, for college grades, and for college attrition/persistence, in order. Major findings are then enumerated. The chapter ends with recommendations for future related research.

GENERAL REVIEW OF THE LITERATURE

Institutions of higher education have traditionally been selective in accepting applicants for matriculation. Early in the twentieth century it was realized that many single and multiple variables could forecast student achievement, for example, high school grades, standardized tests, ability to read, ability to study, and intelligence. Research has emphasized high school grades and achievement/aptitude test scores and has demonstrated fairly conclusively that these measures were the best predictors of college performance. However, high school grades were dependent upon the vagaries of the high school attended.

In attempting to curtain the wastage in higher education, researchers have studied college attrition. Typical investigations identified characteristics which discriminated between dropouts and persisters. College GPA was found to be a significant determinant in college attrition/persistence--students with lower GPA's were more apt to drop out. Poor academic achievement could not account for all dropouts. Consequently, the quality of academic performance with regard to persistence and attrition was studied in relation to performance in high school and on general achievement/

aptitude tests. These studies reported being able to distinguish between high and low achieving students, directly, and between persisters and dropouts, indirectly, In other words, high school grades and standardized test scores could partially differentiate between persisters, transfers, dropouts, and flunkouts.

The relationships between tests, high school performance and the prediction of college achievement, and between college GPA and attrition were relatively stable for the majority of students. This was not true for culturally distinct students. The research seemed to warrant considering several background and foreground factors when attempting to predict the achievement and/or attrition of these students. The factors referenced in this study included socioeconomic status, race, sex, financial aid, employment, and special programs. Although a potential factor, marital status was not considered in this study since there were few married students in the experimental group (one out of seventy-five) and in the control (six out of seventy-five).

College accessibility was definitely related to socioeconomic status, race, sex, and marital status--lower class, racial minority, and married women students were less apt to attend college than their respective counterparts. Financial aid and special programs were both important as means of augmenting student access to higher education, especially the disadvantaged and Blacks. Employment was indirectly associated with college attendance as financial assistance often stipulated work on campus and because the majority of college students were employed at some time during their undergraduate careers.

The prediction of college grades from traditional measures was affected by several factors. Standardized tests have been acknowledged as being favorable to White, middle class persons, that is, disadvantaged and/or minority persons tended to obtain scores significantly below the mean score of the standardization population. Despite the differentials, these tests generally were able to identify student deficits and to measure adequately student ability to perform well in college when no special treatment was involved. However, the accuracy of test predictions seemed to be enhanced when race and sex were considered. Socioeconomic status, financial assistance, and employment, taken independently were not as potent as sex or race in affecting the predictive validity of achievement/aptitude test scores, but the research did warrant considering these factors in various combinations. Special programs, often remedial in nature, distorted prediction of participants' achievement based on test scores. Perhaps separate regression equations developed for participants in each special program were in order, but the research literature offered no specific solution at this time.

College attrition/persistence appeared to be closely related to college accessibility, and there were many examples--lower class, Black, married, and women students were more apt to drop out than their respective counterparts. Financial assistance appeared to impede dropping out, especially for Blacks and for disadvantaged, and probably for married students. Since part-time employment of less than sixteen hours per week did not appear to depress achievement, part-time employment may have been acting as a deterrent to attrition. Special programs have been shown to be effective in reducing attrition rates of high risk disadvantaged/minority students.

PURPOSES OF THE STUDY

The purposes of this study were to determine 1) the usefulness of ACT Composite scores in assessing and predicting achievement and attrition of disadvantaged (Goodrich) and regular freshmen at UNO during the 1972-73 academic year and 2) the effectiveness of the Goodrich program in keeping low income students in school during their freshman year. There were varying numbers of students included in various analyses. Some analyses included up to 1,214 students (all, first semester, full-time, UNO freshmen who had taken the ACT); up to 150 students in the experimental (Goodrich) and control sample; up to 75 students in the experimental or control samples; subsets of the above with as few as 14 students.

Firstly, ACT scores of various groups of freshmen were studied for similarities and differences. Secondly, various groups of freshmen were studied with several variables to determine the best assessors and predictors of college grades (GPA's). Thirdly, various groups of freshmen were studied with several variables to determine the best assessors and predictors of college attrition/persistence.

ACT COMPOSITE SCORES

ACT scores of various groups of freshmen were studied for similarities and differences. The experimental and control groups manifested similar ACT characteristics and, thus, were considered comparable in terms of ability to do college work. Consequently, GPA or attrition differences occurring between the experimental and control groups could not be attributed to differences of scholastic ability.

Blacks had consistently lower ACT scores than Whites, even when grades were controlled. For Black subjects, there were no significant correlations between actual ACT Composite scores and other variables. This may have been related to the restricted range of their ACT scores.

The ACT scores of men and women tended to be similar, for the population (including all, first semester, full-time, UNO freshmen who had taken the ACT) and for various samples. There was one exception, however, for poor, White, control (regular instruction) students with low grades, women had significantly lower ACT scores than men.

There were no significant correlations between ACT scores and financial aid. However, large sample statistics (including all, first, semester, full-time, UNO freshmen who had taken the ACT) revealed that financial aid students (disadvantaged, poor) had a greater proportion of below average ACT scores than nondisadvantaged students, and that experimental (Goodrich) disadvantaged students had a greater percentage of below average ACT scores than nonexperimental disadvantaged students.

Generally, the relationships between grades and ACT scores were consistent, positive, and significant. Persons with below average grades tended to have lower ACT scores than persons with average/above average grades. Persons with average/above average grades tended to have higher ACT scores than persons with below average grades. This was not true for Blacks, however. Again, this may have been related to the restricted range of their ACT scores.

Dropouts and persisters within and between the experimental group and the control group tended to have similar ACT scores. No significant correlations were reported between attrition/persistence and ACT scores. However, when large samples were considered, freshmen persisters had a greater percentage of average/above average ACT scores than freshmen dropouts.

COLLEGE GRADES

Various groups of freshmen were studied with several variables to determine the best assessors and predictors of college grades (GPA's). Generally, ACT scores were dynamic predictors of grades, singly or in combination with other variables. ACT scores accounted for the greatest amount of grade variance often making multiple predictors appear unnecessary. Persons with higher ACT scores tended to get higher grades; persons with lower ACT scores tended to get lower grades. Neither of these relationships were viable for Blacks. The latter relationship was not viable for financial aid recipients and/or special instruction recipients. For students with below average ACT scores, there were no significant single or multiple correlations between grades and other variables.

Blacks tended to have lower grades than Whites, except if they were in the experimental (Goodrich) group. Racial differences with regard to grades were not manifested by experimental subjects. There were no significant correlations between grades and other variables for Black subjects. Consequently, the grades of Blacks could not be predicted at a level better than chance. Whereas, the grades of Whites were very predictable.

Men tended to have lower grades than women, except if they were in the experimental (Goodrich) group. Sex differences with regard to grades were not manifested by experimental subjects. The grades of women were more predictable than the grades of men.

Generally, subjects categorized by financial aid (recipients versus nonrecipients) were not significantly differentiated by grades. However, higher grades were more closely associated with receiving financial aid than with not receiving financial aid. The grades of financial aid recipients were as predictable as the grades of nonfinancial aid recipients.

Experimental subjects had significantly better grades than control subjects, generally, and control nonfinancial aid subjects, specifically. Interestingly, the grades of experimental subjects were not sig-

nificantly better than the grades of control finan
However, even for financial aid recipients, higher
closely associated with being in the experimental
in the control group. Generally, the grades of ex
were more predictable than the grades of control s

As stated above, Whites, women, and experi
more predictable than their counterparts. For W
imental subjects, multiple predictions increased
tor (of race, or sex, or group), to dyadic facto
Other factors (groups or subgroups) did not show
prediction of grades.

However, developing separate correlations
tions for groups and subgroups was necessary. I
into account the heterogeneity of the data (rathe
neity when it was unwarranted) produced higher o
which resulted in greater accuracy. Using just
correlations) developed for the total sample appe
egorization (and subcategorization) of subjects b
general achievement/aptitude, race, sex, or race
diction of grades.

COLLEGE ATTRITION/PERSISTENC

Various groups of freshmen were studied w
to determine the best assessors and predictors of
Grades were consistently potent predictors of att
gardless of the sets or subsets studied within th

perimental and control sample. Persons with average and above average grades tended to persist; persons with below average grades tended to drop out. Singly or in combination with other variables, grades accounted for the greatest amount of attrition/persistence variance, often making multiple predictors appear unnecessary. When grades were not available, with the exception of experimental men, attrition/persistence could not be adequately predicted.

Generally, for large samples, average or above average ACT scores were good indicators of persistence, but below average ACT scores were not good indicators of attrition. For the experimental and control sample, dropouts tended to have lower ACT scores than persisters, but the differences were not significant. That is, ACT scores were not significantly related to attrition/persistence. Multiple correlations revealed that the attrition/persistence of persons with below average ACT scores was more predictable than the attrition/persistence of persons with average or above average ACT scores.

Race did not differentiate dropouts and persisters. That is, there were no racial differences with regard to attrition/persistence in any of the sets or subsets of subjects considered. However, multiple correlations revealed that the attrition/persistence of Blacks was more predictable than the attrition/persistence of Whites.

Sex did not differentiate dropouts and persisters. That is, there were no sex differences with regard to attrition/persistence in any of the sets or subsets of subjects considered. Multiple correlations revealed that both men and women were very predictable in terms of attrition/persistence.

Generally, for large samples (including the UNO freshman ACT population), experimental freshmen and financial aid freshmen compared favorably, in terms of attrition/persistence, with nonexperimental freshmen and nonfinancial aid freshmen, respectively. That is, the former students dropped out less than the latter students. But when experimental freshmen (special instruction, financial aid recipients) and nonexperimental financial aid freshmen (regular instruction, financial aid recipients) were compared, there were no significant differences in terms of attrition/persistence. Considering the experimental and control sample. Goodrich students, Goodrich Blacks, and Goodrich males were more likely to remain in school than their control counterparts. Thus, the Goodrich program was generally more effective than the regular program in keeping low income students, low income Blacks, and low income males in school during their freshman year. However, this may have been an artifact resulting from Goodrich courses elevating experimental subjects' GPA's. That is, the effectiveness of the Goodrich program in keeping low income students in school may have been directly related to the higher grades of the Goodrich courses, as grades were the best predictors of attrition/persistence. Multiple correlations indicated that experimental subjects and financial aid subjects were more predictable than control subjects and nonfinancial aid subjects, respectively.

Multiple regression equations developed for subjects categorized (and subcategorized) by group, financial aid, general achievement/aptitude, race, sex, or race and sex produced more precise results. That is, considering the vagaries of each set or subset of subjects provided a different and more realistic picture of the predictability of attrition/persistence.

MAJOR FINDINGS

1) ACT scores were effective predictors of college grades among

White students--disadvantaged (Goodrich) and regular.

2) ACT scores were not viable predictors of college grades among Black students--disadvantaged (Goodrich) and regular.

3) ACT scores were effective predictors of college attrition/ persistence among regular students in large samples.

4) ACT scores were not viable predictors of college attrition/ persistence among disadvantaged (Goodrich) and control students in small samples.

5) College grades were potent predictors of attrition/persistence among disadvantaged (Goodrich) and regular students.

6) In terms of overall GPA's, disadvantaged (Goodrich) students did better than control students. However, this appeared to be an artifact produced by Goodrich courses which elevated experimental GPA's. There was no significant GPA difference between the groups for regular courses.

7) In terms of persistence, the Goodrich program was better than the regular program, especially for men and for Blacks. However, this may have been an artifact related to Goodrich courses which elevated experimental GPA's. And higher grades were conducive to persistence.

8) In terms of persistence, receiving financial aid was better than not receiving financial aid.

RECOMMENDATIONS FOR FUTURE RESEARCH

In the future, additional Goodrich freshmen and comparable control groups could be studied with regard to college achievement and attrition/

persistence. Those groups could be studied individually, as well as collectively (to increase sample size) with the groups of this study. Goodrich freshmen could be followed through sophomore, junior, and senior years to provide an extended view of program results.

Follow-up testing with the ACT would be interesting. The newer general achievement/aptitude scores might correlate even higher with grades. How would the differences (between ACT scores) relate to grades or attrition/persistence? What differences would result for which groups? How could the results be translated into curriculum?

It would be valuable to allow regular freshmen to take Goodrich courses. Regular freshmen (with no financial aid), equal in number to Goodrich freshmen, in Goodrich courses could allow a direct comparison of special instruction with or without financial aid and regular instruction with or without financial aid. At the present time there are no Goodrich students who do not receive financial aid, so the design is incomplete. Studies of this nature could help to determine if financial aid, special instruction, or their interaction is the ingredient of college success (achievement and/or persistence).

Financial aid programs could be evaluated directly. In other words, research with freshmen in regular programs who receive or do not receive financial aid could help in the effective allocation of monetary resources. And there are various kinds of financial aid programs to be investigated.

The Educational Support Program (ESP) could be studied for effects on achievement and persistence. ESP students (marginal in general achievement/aptitude) enroll in special small classes which may use easier reading materials. ESP students were too few in this study to provide answers. Cost factors could also be considered and various programs compared.

And finally, the grading system needs direct investigation. Grades, in this study, were the best predictors of attrition/persistence. And low grades were a major determinant of dropping out. Goodrich courses helped Goodrich students by increasing their GPA's. Are there viable alternatives? For example, consider credit/no credit courses. Providing an alternative to an F grade might reduce attrition considerably.

APPENDICES

Appendix A: Product Moment Correlation Corrections

Appendix B: ACT and Employment, Uncorrected Product Moment Correlations

Appendix C: Grades: Uncorrected Product Moment Correlations

Appendix D: Attrition/Persistence: Uncorrected Product Moment Correlations

Appendix E: ACT Descriptive Data: Means and Standard Deviations

Appendix F: Cumulative GPA Descriptive Data: Means and Standard Deviations

Appendix G: Grades Descriptive Data: Means and Standard Deviations of GPA's Categorized According to Type of Courses

Appendix H: Attrition/Persistence Descriptive Data: Means and Standard Deviations

Appendix A

Product Moment Correlation Corrections

Variables Correlated	Obtained Correlation	Corrected Correlation
U x G	phi	estimated pt. biserial*
U x A	phi	estimated pt. biserial*
U x Ta	pt. biserial	
U x R	phi	
U x S	phi	
F x G	phi	estimated pt. biserial*
F x A	phi	estimated pt. biserial*
F x Ta	pt. biserial	
F x R	phi	
F x S	phi	
Ta x G	biserial	
Ta x A	biserial	
Ta x R	pt. biserial	
Ta x S	pt. biserial	
Ta x E	Pearson	Pearson corrected for coarse grouping**
R x G	phi	estimated pt. biserial*
R x A	phi	estimated pt. biserial*
R x S	phi	
R x E	pt. biserial	
S x G	phi	estimated pt. biserial*
S x A	phi	estimated pt. biserial*
S x E	pt. biserial	
E x G	biserial	
E x A	biserial	
G x A	phi	estimated Pearson***

Variables

U=Group: 1(experimental); 2(control)
G=Grades: 1(below avg.); 2(avg. & above avg.)
A=Attrition: 1(dropout); 2(persister)
Ta=Gen. Ach./Apt. (test): Actual ACT Composite scores
R=Race: 1(Black); 2(White)
S=Sex: 1(male); 2(female)
F=Financial Aid: 1(received); 2(not received)
E=Employment, hours: 1(0); 2(1-10); 3(11-20); 4(21-30); 5(31+)

*W. B. Michael, N. C. Perry and J. P. Guilford, "The Estimation of a Point Biserial Coefficient of Correlation From a Phi Coefficient," British Journal of Psychology, Statistical Section, 5:139-150, Nov., 1952.

**Charles C. Peters and Walter R. VanVoorhis, Statistical Procedures and their Mathematical Bases (New York: McGraw Hill, 1940), p. 398.

***J. P. Guilford and N. C. Perry, "Estimation of Other Coefficients of Correlation From the Phi Coefficient," Psychometrika, 16:335-346, Sept., 1951; see also J. P. Guilford and Benjamin Fruchter, Fundamental Statistics in Psychology and Education (5th ed., New York: McGraw Hill, 1973), p. 323.

Appendix B

ACT and Employment, Uncorrected Product Moment Correlations

	Subjects										
	All	Financial Aid		Race		Sex		Race & Sex			
Variables		R	N	B	W	M	F	BM	BF	WM	WF
E x Ta:											
exp. r	.24*	.24*		.10	.20	.09	.37*	.30	-.16	.12	.32
n	(75)	(75)		(35)	(40)	(34)	(41)	(16)	(19)	(18)	(22)

*p<.05. (two tailed test)

Variables
E=Employment, hours: 1(0); 2(1-10); 3(11-20); 4(21-30); 5(31+)
Ta=Gen. Ach./Apt. (test): Actual ACT Composite scores

Subjects
All=all subjects in the specified sample, namely, experimental
Financial Aid=R(recipients); N(nonrecipients)
Race=B(Blacks); W(Whites)
Sex=M(males); F(females)
Race & Sex= BM(Black males); BF(Black females); WM(White males); WF(White females)

r(product moment correlation); n(sample size)
exp. r=correlation of experimental sample

Appendix C

Grades: Uncorrected Product Moment Correlations

	Subjects				
	All	FinancialAid		Gen.Ach./Apt.(test)	
Variables		R	N	BA	A&AA
U x G:					
tot. r	-.16*	-.12		-.06	-.18
n	(143)	(96)		(58)	(85)
F x G:					
tot. r	-.12			-.11	-.14
n	(143)			(58)	(85)
con. r	-.02			-.08	-.06
n	(70)			(31)	(39)
Ta x G:					
tot. r	.45**	.47**			
n	(143)	(96)			
exp. r	.54**	.54**			
n	(73)	(73)			
con. r	.37*	.18	.47*		
n	(70)	(23)	(47)		
R x G:					
tot. r	.25**	.26**		-.01	.22*
n	(143)	(96)		(58)	(85)
exp. r	.21	.21		-.02	.12
n	(73)	(73)		(27)	(46)
con. r	.28*	.25	.26	.07	.31
n	(70)	(23)	(47)	(31)	(39)
S x G:					
tot. r	.07	-.01		-.03	-.10
n	(143)	(96)		(58)	(85)
exp. r	-.01	-.01		-.05	.10
n	(73)	(73)		(27)	(46)
con. r	.16	-.09	.24	.03	.28
n	(70)	(23)	(47)	(31)	(39)
E x G:					
exp. r	.25	.25		.32	-.01
n	(73)	(73)		(27)	(46)

*p<.05; **p<.01. (two tailed tests)

Subjects

All=all subjects in the specified sample: total; experimental; control

Financial Aid=R(recipients); N(nonrecipients)

Gen.Ach./Apt.(test)=BA(S's w/ below avg. ACT scores); A&AA (S's w/ avg. & above avg. ACT scores)

Race=B(Blacks); W(Whites)

Sex=M(males); F(females)

Race & Sex=BM(Black males); BF(Black females); WM(White males); WF(White Females)

(Legend continued on next page)

Appendix C (continued)

Variables		Subjects							
		Race		Sex		Race & Sex			
		B	W	M	F	BM	BF	WM	WF
U x G:									
tot.	r	-.19	-.13	-.26*	-.05	-.20	-.12	-.27	.06
	n	(64)	(79)	(65)	(78)	(30)	(34)	(35)	(44)
F x G:									
tot.	r	-.14	-.14	-.25*	.01	-.14	-.08	-.31	.05
	n	(64)	(79)	(65)	(78)	(30)	(34)	(35)	(44)
con.	r	-.01	-.04	-.05	.08	.03	-.12	-.25	.12
	n	(31)	(39)	(31)	(39)	(14)	(17)	(17)	(22)
Ta x G:									
tot.	r	.08	.50**	.35*	.56**	.07	.09	.38	.69**
	n	(64)	(79)	(65)	(78)	(30)	(34)	(35)	(44)
exp.	r	.25	.70**	.52*	.55**	.17	.31	.76*	.64*
	n	(33)	(40)	(34)	(39)	(16)	(17)	(18)	(22)
con.	r	-.21	.35	.21	.56**	-.19	-.21	.21	.74*
	n	(31)	(39)	(31)	(39)	(14)	(17)	(17)	(22)
R x G:									
tot.	r			.16	.31**				
	n			(65)	(78)				
exp.	r			.17	.20				
	n			(34)	(39)				
con.	r			.11	.37*				
	n			(31)	(39)				
S x G:									
tot.	r	.03	-.12						
	n	(64)	(79)						
exp.	r	-.02	-.05						
	n	(33)	(40)						
con.	r	.01	.25						
	n	(31)	(39)						
E x G:									
exp.	r	.18	.25	-.02	.48*	.00	.23	-.23	.62*
	n	(33)	(40)	(34)	(39)	(16)	(17)	(18)	(22)

$*p<.05$; $**p<.01$. (two tailed tests)

Variables

G=Grades: 1(below avg.); 2(avg. & above avg.)
U=Group: 1(experimental); 2(control)
F=Financial Aid: 1(received);2(not received)
Ta=Gen.Ach./Apt.(test): Actual ACT Composite scores
R=Race: 1(Black); 2(White)
S=Sex: 1(male); 2(female)
E=Employment, hours: 1(0); 2(1-10); 3(11-20); 4(21-30); 5(31+)

r (product moment correlation); n(sample size)

tot. r=correlation of entire sample
exp. r=correlation of experimental sample
con. r=correlation of control sample

Appendix D

Attrition/Persistence: Uncorrected Product Moment Correlations

Variables		Subjects: All	Financial Aid: R	Financial Aid: N	Gen.Ach./Apt.(test): BA	Gen.Ach./Apt.(test): A&AA
U x A:						
tot.	r	-.14	-.11		-.10	-.13
	n	(150)	(100)		(62)	(88)
F x A:						
tot.	r	-.10			-.13	-.09
	n	(150)			(62)	(88)
con.	r	.03			-.09	.04
	n	(75)			(33)	(42)
Ta x A:						
tot.	r	.17	.23			
	n	(150)	(100)			
exp.	r	.23	.23			
	n	(75)	(75)			
con.	r	.12	.12	.13		
	n	(75)	(25)	(50)		
R x A:						
tot.	r	.08	.08		-.01	-.02
	n	(150)	(100)		(62)	(88)
exp.	r	.02	.02		-.11	-.06
	n	(75)	(75)		(29)	(46)
con.	r	.14	.19	.08	.02	.04
	n	(75)	(25)	(50)	(33)	(42)
S x A:						
tot.	r	.01	-.03		.15	-.07
	n	(150)	(100)		(62)	(88)
exp.	r	-.07	-.07		.11	-.19
	n	(75)	(75)		(29)	(46)
con.	r	.10	.05	.09	.09	.02
	n	(75)	(25)	(50)	(33)	(42)
E x A:						
exp.	r	-.02	-.02		.01	-.21
	n	(75)	(75)		(29)	(46)
G x A:						
tot.	r	.43**	.44**		.47**	.29**
	n	(143)	(96)		(58)	(85)
exp.	r	.42**	.42**		.50**	.20
	n	(73)	(73)		(27)	(46)
con.	r	.39**	.37	.35*	.37*	.27
	n	(70)	(23)	(47)	(31)	(30)

*p<.05; **p<.01. (two tailed tests)

Subjects

All=all subjects in the specified sample: total; experimental; control

Financial Aid=R(recipients); N(nonrecipients)

Gen.Ach./Apt.(test)=BA(S's w/ below avg. ACT scores); A&AA(S's w/ avg. & above avg. ACT scores)

Race=B(Blacks); W(Whites)

Sex=M(males); F(females)

Race & Sex=BM(Black males); BF(Black females); WM(White males); WF(White females)

Appendix D (continued)

		Subjects							
		Race		Sex		Race & Sex			
Variables		B	W	M	F	BM	BF	WM	WF
U x A:									
tot.	r	-.21	-.06	-.25*	-.03	-.25	-.11	-.19	.00
	n	(70)	(80)	(68)	(82)	(32)	(38)	(36)	(44)
F x A:									
tot.	r	-.10	-.09	-.17	-.01	-.08	-.02	-.20	.05
	n	(70)	(80)	(68)	(82)	(32)	(38)	(36)	(44)
con.	r	.03	-.05	.04	.03	.22	-.01	-.15	-.03
	n	(35)	(40)	(34)	(41)	(16)	(19)	(18)	(22)
Ta x A:									
tot.	r	.13	.14	.21	.15	.35	-.04	.00	.28
	n	(70)	(80)	(68)	(82)	(32)	(38)	(36)	(44)
exp.	r	.22	.37	.41	.09	.60	-.09	.28	.40
	n	(35)	(40)	(34)	(41)	(16)	(19)	(18)	(22)
con.	r	.02	-.05	[illegible]	.20	.05	.02	-.14	.13
	n	(35)	(40)	(34)	(41)	(16)	(19)	(18)	(22)
R x A:									
tot.	r			.10	.02				
	n			(68)	(82)				
exp.	r			.03	-.01				
	n			(34)	(41)				
con.	r			.11	.10				
	n			(34)	(41)				
S x A:									
tot.	r	.04	-.01						
	n	(70)	(80)						
exp.	r	-.05	-.12						
	n	(35)	(40)						
con.	r	.08	.07						
	n	(35)	(40)						
E x A:									
exp.	r	-.04	.00	-.29	.19	-.30	.24	-.23	.25
	n	(35)	(40)	(34)	(41)	(16)	(19)	(18)	(22)
G x A:									
tot.	r	.37**	.48**	.44**	.39**	.42*	.27	.38*	.53**
	n	(64)	(79)	(65)	(78)	(30)	(34)	(35)	(44)
exp.	r	.26	.57**	.44**	.35*	.45	.24	.60	.56**
	n	(33)	(40)	(34)	(39)	(16)	(17)	(18)	(22)
con.	r	.34	.34*	.31	.37*	.45	.37	.29	.37
	n	(31)	(39)	(31)	(39)	(14)	(17)	(17)	(22)

*p<.05; **p<.01. (two tailed tests)

Variables

A=Attrition: 1(drop out); 2(persist)
U=Group: 1(experimental); 2(control)
F=Financial Aid: 1(received); 2(not received)
Ta=Gen.Ach./Apt.(test): Actual ACT Composite scores
R=Race: 1(Black); 2(White)
S=Sex: 1(male); 2(female)
E=Employment, hours: 1(0); 2(1-10); 3(11-20); 4(21-30); 5(31+)

r(product moment correlation)
n(sample size)

tot. r=correlation of entire sample
exp. r=correlation of experimental sample
con. r=correlation of control sample

Appendix E

ACT Descriptive Data: Means and Standard Deviations

		Subject Subsets													
		FinancialAid		Race		Sex		Race & Sex				Grades		Attrition	
	All	R	N	B	W	M	F	BM	BF	WM	WF	BA	A&AA	D	P
Subject Sets															
Sample:															
$\overline{X}$	16.17	15.69		11.49	20.28	16.59	15.83	11.97	11.08	20.69	19.93	13.27	17.97	14.94	16.77
SD	6.40	6.34		3.67	5.38	6.69	6.17	3.60	3.74	6.12	4.74	4.88	6.58	6.38	6.36
n	(150)	(100)		(70)	(80)	(68)	(82)	(32)	(38)	(36)	(44)	(51)	(92)	(49)	(101)
Exp.:															
$\overline{X}$	16.45	16.45		11.69	20.63	16.94	16.05	12.38	11.11	21.00	20.32	12.45	18.21	14.63	17.07
SD	6.35	6.35		4.08	4.88	6.15	6.56	4.05	4.12	4.68	5.12	4.37	6.26	6.28	6.31
n	(75)	(75)		(35)	(40)	(34)	(41)	(16)	(19)	(18)	(22)	(20)	(53)	(19)	(56)
Con.:															
$\overline{X}$	15.89	13.40	17.14	11.29	19.93	16.24	15.61	11.56	11.05	20.39	19.55	13.81	17.64	15.13	16.40
SD	6.48	5.87	6.47	3.27	5.89	7.27	5.82	3.16	3.42	7.42	4.40	5.19	7.06	6.53	6.47
n	(75)	(25)	(50)	(35)	(40)	(34)	(41)	(16)	(19)	(18)	(22)	(31)	(39)	(30)	(45)

Subject Subsets

All=all subjects in the specified set: sample; experimental group; control group
FinancialAid=R(recipients); N(nonrecipients)
Race=B(Blacks); W(Whites)
Sex=M(males); F(females)
Race & Sex=BM(Black males); BF(Black females); WM(White males); WF(White females)
Grades=BA(S's w/ below avg. GPA's); A&AA(S's w/ avg. & above avg. GPA's)
Attrition=D(dropouts); P(persisters)

Subject Sets

Sample=subjects in the total sample, that is, the experimental and control groups combined
Exp.=subjects in the experimental group
Con.=subjects in the control group

Symbols

$\overline{X}$=mean ACT Composite score for the indicated set or subset
SD=standard deviation of ACT Composite scores for indicated set or subset
n=number of subjects in specified set or subset used to compute the mean and the standard deviation

Appendix F

Cumulative GPA Descriptive Data: Means and Standard Deviations

		Subject Subsets													
		FinancialAid		Gen.Ach./Apt.		Race		Sex		Race & Sex				Attrition	
Subject Sets	All	R	N	BA	A&AA	B	W	M	F	BM	BF	WM	WF	D	P
Sample:															
X̄	2.190	2.251		1.755	2.488	1.870	2.450	2.182	2.197	1.193	1.831	2.413	2.480	1.431	2.506
SD	.932	.968		.958	.790	.940	.843	.911	.955	.841	1.030	.916	.794	1.100	.628
n	(143)	(96)		(58)	(85)	(64)	(79)	(65)	(78)	(30)	(34)	(35)	(44)	(42)	(101)
Exp.:															
X̄	2.319	2.319		1.703	2.681	2.053	2.540	2.334	2.306	2.036	2.070	2.600	2.489	1.377	2.606
SD	.941	.941		1.039	.657	.912	.918	.900	.986	.919	.933	.818	1.008	1.250	.589
n	(73)	(73)		(27)	(46)	(33)	(40)	(34)	(39)	(16)	(17)	(18)	(22)	(17)	(56)
Con.:															
X̄	2.056	2.035	2.066	1.801	2.259	1.674	2.360	2.016	2.088	1.773	1.593	2.215	2.471	1.469	2.382
SD	.910	1.040	.851	.897	.878	.944	.765	.907	.922	.749	1.095	.996	.523	1.011	.660
n	(70)	(23)	(47)	(31)	(39)	(31)	(39)	(31)	(39)	(14)	(17)	(17)	(22)	(25)	(45)

Subject Subsets

All=all subjects in the specified set: sample; experimental group; control group
FinancialAid=R(recipients); N(nonrecipients)
Gen.Ach./Apt.=BA(S's w/ below avg. ACT scores); A&AA(S's w/ avg. & above avg. ACT scores)
Race=B(Blacks); W(Whites)

APPENDIX G

Grades Descriptive Data:

Means and Standard Deviations of

GPA's Categorized According to Type of Courses

Subject Sets		Type of Courses Comprising GPA's		
		Total GPA	Regular GPA	Experimental (Goodrich) GPA
Experimental:	$\bar{X}$	2.3194	2.0996	2.8730
	SD	.9408	.9854	.8274
	n	(73)	(73)	(61)
Control:	$\bar{X}$	2.0559	2.0559	
	SD	.9095	.9095	
	n	(70)	(70)	

Type of Courses Comprising GPA's

Total GPA = Cumulative GPA based on all types of courses (regular and experimental, Goodrich)

Regular GPA = Cumulative GPA based only on regular (nonGoodrich) courses

Experimental GPA = Cumulative GPA based only on experimental (Goodrich) courses

Subject Sets

Experimental = subjects in the experimental group who received grades

Control = subjects in the control group who received grades

Symbols

$\bar{X}$ = mean GPA for the indicated set

SD = standard deviation of cumulative GPA's for indicated set

n = number of subjects in specified set used to compute the mean and the standard deviation

Appendix H

Attrition/Persistence Descriptive Data: Means and Standard Deviations

	Subject Subsets														
		FinancialAid		Gen.Ach./Apt.		Race		Sex		Race & Sex				Grades	
	All	R	N	BA	A&AA	B	W	M	F	BM	BF	WM	WF	BA	A&AA
Subject Sets															
Sample:															
$\overline{X}$	1.673	1.710		1.548	1.761	1.629	1.713	1.662	1.683	1.594	1.658	1.722	1.705	1.431	1.859
SD	.471	.456		.502	.429	.487	.456	.477	.468	.499	.481	.454	.462	.500	.350
n	(150)	(100)		(62)	(88)	(70)	(80)	(68)	(82)	(32)	(38)	(36)	(44)	(51)	(92)
Exp.:															
$\overline{X}$	1.747	1.747		1.621	1.826	1.743	1.750	1.794	1.707	1.750	1.737	1.833	1.682	1.450	1.887
SD	.438	.438		.494	.383	.443	.439	.410	.461	.447	.452	.384	.477	1.814	.320
n	(75)	(75)		(29)	(46)	(35)	(40)	(34)	(41)	(16)	(19)	(18)	(22)	(20)	(53)
Con.:															
$\overline{X}$	1.600	1.600	1.600	1.485	1.691	1.514	1.675	1.529	1.659	1.438	1.579	1.611	1.727	1.419	1.821
SD	.493	.500	.495	.508	.468	.507	.474	.507	.480	.512	.507	.502	.456	.502	.389
n	(75)	(25)	(50)	(33)	(42)	(35)	(40)	(34)	(41)	(16)	(19)	(18)	(22)	(31)	(39)

Subject Subsets

All=all subjects in the specified set: sample; experimental group; control group

FinancialAid=R(recipients); N(nonrecipients)

Gen.Ach./Apt.=BA(S's w/ below avg. ACT scores); A&AA(S's w/ avg. & above avg. ACT scores)

Race=B(Blacks); W(Whites)

Sex=M(males); F(females)

Race & Sex=BM(Black males); BF(Black females); WM(White males); WF(White females)

Grades=BA(S's w/ below avg. GPA's); A&AA(S's w/ avg. & above avg. GPA's)

Subject Sets

Sample=subjects in the total sample, that is, the experimental and control groups combined

Exp.=subjects in the experimental group

Con.=subjects in the control group

Symbols

$\overline{X}$=mean attrition/persistence score for the indicated set or subset

SD=standard deviation of attrition/persistence scores for indicated set or subset

n=number of subjects in specified set or subset used to compute the mean and the standard deviation